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REPORT ON HEARINGS

REPAP MANITOBA INC.

PHASE I MODIFICATION AND EXPANSION

OF THE MANFOR COMPLEX

THE MANITOBA CLEAN ENVIRONMENT COMMISSION

November 1989

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REPAP MANITOBA INC.

PHASE I MODIFICATION AND EXPANSION

OF THE MANFOR COMPLEX

BACKGROUND

The Manfor pulp and paper complex located in The Pas, Manitoba, was purchased on May 4, 1989 from the Manitoba Government by Repap Enterprises Inc. In accordance with the purchase agreement, Repap Manitoba Inc. registered a proposal to upgrade and modify the pulp mill with the Department of Environment for licensing under the Manitoba Environment Act on April 18, 1989.

Site Description and Mill History

Located about 2.5 Km north of The Pas, Manitoba, just north of the Saskatchewan River, the existing mill consists of a Kraft pulp and paper mill, a saw mill, and a number of associated structures. There is both road (Highway 10) and rail access (Canadian National Railway) to the mill. The mill is the major employer of residents in the Town of The Pas. Wood cutting to provide feedstock for the mill is also a significant source of employment for the area. In addition, commercial fishing, trapping and tourism are important industries.

The pulp and paper mill in The Pas has had an unsatisfactory history, in terms of both economic and environmental performance. Since the mill was constructed in the late 1960's by Churchill Forest Industries, it has been a controversial operation. In 1973 the mill came under the ownership and management of Manfor, a Manitoba Government Crown Corporation. For a variety of reasons the mill operation experienced frequent years of financial losses.

BACKGROUND (cont.)

Built with 1960's technology, the mill has emitted high and unregulated levels of some pollutants in mill effluents. Waste discharges to the air and soil have always been under provincial jurisdiction, but no Order under the old Clean Environment Act was ever issued to cover these facets of the operation. In the past, atmospheric emissions of particulates from the mill and total reduced sulphur (TRS) often exceeded provincial guidelines, but licensed limits for atmospheric releases were never established. Wastewater emissions from this mill presently are regulated only under Federal regulations, but the Province of Manitoba intends to assume licensing responsibility in the near future.

Groundwater contamination at the site has occurred from previous spills of Bunker C fuel oil. Leaks of sewage and process wastewater have also caused groundwater contamination to the extent that groundwater at the site is no longer useable for industrial or domestic purposes.

Federal regulations under the Fisheries Act came into force in 1971 and have regulated wastewater discharges from new mills constructed after that date. For older mills the limits were applied only as guidelines until these mills could be modernized and brought into compliance. In 1979, Manfor entered into a compliance schedule with Environment Canada to reduce levels of total suspended solids, biological oxygen demand and toxicity in wastewater discharges to the Saskatchewan River. This was achieved by installing a secondary treatment plant and, since 1979, the Company has met Federal limits, with only a few exceptions.

The 1989 Clean Environment Commission hearings addressed in this report are the first public hearings held for this pulp and paper complex, under the Manitoba Environment Act. No previous hearings were held under this or earlier relevant legislation.

BACKGROUND (Cont.)

The Clean Environment Commission

The Clean Environment Commission presently consists of nine citizens appointed to the Commission by Order-in-Council under the chairmanship of a full-time civil servant. For the purpose of the Repap hearings, an additional Commissioner, from the Pas area, was appointed to the Commission. He provided a northern perspective with local knowledge and insight into the Commission's deliberation on the Repap proposal.

The Clean Environment Commission's basic function is to facilitate public input, hear all relevant evidence and argument and, after due consideration, make recommendations to the Environment Minister and his Department with regard to the licensing of a proposal which has been registered and is being considered for licensing by the Environment Department under the Environment Act.

Clean Environment Commission Hearings

Public participation in Manitoba's environmental decision making process has been facilitated by Clean Environment Commission hearings since the late 1960's when it was established under the then new Clean Environment Act. This basic role and responsibility of "developing and maintaining public participation in environmental matters" continues under the new Environment Act (1987). The primary mechanism used to achieve this has been the holding of public hearings, although the Commission is not limited to this means.

In order to facilitate and encourage public participation the Commission has carefully tailored procedures that years of experience have shown will accomplish this goal. Hearings are held in the community where the development under consideration is located - as well as in other population centres where interest is high and when the environmental impact is sufficient to provide a legitimate interest for individuals or environmental groups located elsewhere. The hearing procedure has been kept as informal as

BACKGROUND (Cont.)

possible to make the general atmosphere conducive to participation on the part of individuals not having previous skills or experience in making public presentations.

Regardless of the magnitude of the operation under consideration, in all but a very small percentage of the Commission's hearings the proponent and other groups making presentations have not found it necessary to be represented by legal counsel; nor has the Commission. However, representation by counsel is a fundamental right and in some of the more contentious and lengthy of the Commission's past hearings, several parties have retained legal counsel. The Repap hearing is one where presentations, including the environmental impact statement, were the longest and most complex in the Commission's experience, and certainly where cross-examination by legal counsel for the proponent and other organizations - as well as non-legal participants - was more extensive than in any previous hearing.

It seems likely that with a new and intensified interest and concern for the environment, with the possibility of intervenor funding for environmental organizations, and with more large development projects in the offing, that the utilization of legal counsel is likely to continue and expand. The Commission believes that there is great value in preserving an informal atmosphere with its resultant ease of access to the hearing process by the general public. It must therefore carefully consider mechanisms to deal effectively with the seemingly normal practice of the legal profession to use more formal, legalistic, courtroom-type, procedures. The Commission must ensure that the evidence and opinions of all presenters are treated with respect. Fair and legitimate cross examination does not have to be an intimidating experience. The comfort of all presenters at hearings guarantees concomitant respect for the deliberations of the Commission, and ultimately, the government itself.

BACKGROUND (Cont.)

The Repap Phase I Hearing

On May 31, 1989, following the advertisement of the Repap Phase I mill alteration proposal by the Environment Department, the issuance of guidelines by the Department for the preparation of an Environmental Impact Assessment, and the preparation of a draft assessment by the proponent, the Honourable J. Glen Cummings, Minister of Environment, advised the Clean Environment Commission that there was sufficient information available to support a meaningful public hearing process on the proposal and requested that the Commission hold public hearings. The purpose of the hearings was to provide the Department of Environment with a report and recommendations on licensing of the Repap Phase I alteration to their mill under the Environment Act to cover the operation of the facility.

Following notification of parties which had previously indicated an interest in the matter, and the placement of advertisements in appropriate newspapers, hearings were held in The Pas, Manitoba on August 21-24 and September 14, and in Winnipeg on August 28-31 and September 1, 5 and 6. Commissioners in attendance at the hearings were Mr. Stan Eagleton, Chairperson, Mr. Arnold Barr, Mr. Maurice Blanchard, Mr. Leonard Flett, Mr. Ed Gramiak, Mrs. Joan Vestby and Dr. Barrie Webster. At the request of the Minister, Mr. Ed Johanson, from The Pas, was appointed to the Commission for the Repap Phase I hearings and subsequent Commission considerations. Mr. Johanson is a member of the Manitoba Environmental Council and active on a number of other northern Manitoba committees and organizations.

The Proposal

The Repap Manitoba Inc. proposal describes pulp mill alterations referred to as the Phase I mill conversion. The proposed alterations would provide for expansion of pulp and paper production from a nominal 400 tonnes/day to 500 tonnes/day. Rather than producing unbleached Kraft paper,

BACKGROUND (Cont.)

as at present, Phase I modifications would result in production of bleached pulp only, which would be used to make paper at mills owned by the Company elsewhere (e.g., Wisconsin, U.S.A.) or sold to other paper manufacturers. Further plans for future development by Repap will be the subject of separate Environment Act licence proposals.

Guidelines and the Environmental Impact Assessment

A proposal for licensing of the Repap Phase I mill conversion under the Environment Act was registered with the Department of Environment on April 18, 1989. Guidelines for the preparation of an Environmental Impact Assessment capable of satisfying requirements of the Act were prepared by the Department, assisted by an inter-departmental Technical Advisory Committee with representatives from the Departments of Environment, Natural Resources, Health and Municipal Planning. Draft guidelines were given to Repap on March 14, 1989 and final guidelines were forwarded by the Department to Repap, on May 1, 1989. This Assessment was conducted by MacLaren Plansearch Inc. for Repap, and the initial submission (Exhibit 2a) was received by the Department of Environment on May 23, 1989. A supplementary report (Exhibit 2b) was received June 6, 1989. Following detailed comment by the Technical Advisory Committee on these reports, which constitute the Environmental Impact Statement, MacLaren submitted a Response to Government Evaluation (Exhibit 3) on August 15, 1989. Further documents provided by MacLaren as work progressed were titled Environmental Impact Mitigation (Exhibit 4) and Environmental Monitoring Program (Exhibit 5).

Forestry management practices related to the provision of wood for pulp feedstock for the Phase I proposal were not part of the Minister's request for consideration at these hearings. At present, Repap is operating under the forestry management plan developed for Manfor and licensed to Manfor under the Forestry Act. This licence will continue to be in effect until 1992. However, just prior to these hearings, Repap was requested by the

BACKGROUND (Cont.)

Minister of Environment to submit a proposal by September 30, 1989, for a new forestry management plan for the period 1990 to 1994 that will supercede the existing plan. The Minister identified that after the proposal is submitted and an Environmental Impact Assessment of the forest management plan is completed, the Clean Environment Commission will be requested to hold public hearings at an appropriate time on the new management plan. The Minister also stated that public input will be sought on the guidelines for the development of the environmental impact assessment required for this forest management plan. (The forest management proposal was registered by Repap on September 28, 1989).

PRESENTATIONS AT THE HEARING

Description of the Phase I Mill Conversion

Introduction

Mr. Paul Richards, Vice-President and General Manager of Repap Manitoba Inc. described the proposed Phase I modification and expansion of the pulp mill in The Pas. Similar presentations were made by Mr. Richards at the beginning of the hearing sessions in both The Pas and Winnipeg.

The existing pulp and paper mill, which has not yet been altered since Repap purchased it from Manfor, produces 140,000 tonnes of high quality unbleached Kraft paper per year. The end-use for this product is multi-wall shipping bags used primarily for liners in cement bags, fertilizer bags and pet food bags and, to a smaller degree, grocery bags. The brown Kraft paper produced in The Pas is of high quality because the softwood trees growing in the boreal forest, the source of the feed stock, produce long cellulose fibres.

Approximately one-quarter of the product from the Manfor mill is sold in Canada, two-thirds in the U.S.A. and some in other countries, primarily Central America. There has been a 25% reduction in total consumption of unbleached Kraft paper in the U.S.A. over the last ten years, forcing a number of suppliers out of the market. Mr. Richards expected that unbleached Kraft paper demands would continue to shrink. Even if the market did recover, the cost of pulp wood and transportation factors in The Pas operation would prevent Repap from successfully competing with low cost producers located closer to the main manufacturers and market (e.g., in the U.S.A.).

Mr. Richards said that Repap wanted to produce bleached pulp in The Pas because it is a much more valuable product than unbleached Kraft paper, and market predictions for bleached pulp appear to be firmer. It did not make sense for Repap to produce low value unbleached Kraft paper when they could produce a higher value product.

DESCRIPTION OF THE PHASE I MILL CONVERSION (Cont.)

Wood in Northern Manitoba is expensive relative to many other supply sources, especially fast growing plantations in the southern United States, which yield shorter cellulose fibers. Slow growing conditions for trees in the boreal region of The Pas result in long, thin cellulose fibers that yield a very desirable wood pulp, ideal for producing high quality coated paper.

Repap is aware of public concerns about the bleaching of wood pulp, bleached paper products and the resultant chlorinated organic contaminants, including dioxins and furans, that will be produced in the mill process, and recognizes that future markets may change to demand more dioxin-free, unbleached paper. Mr. Richards said that the proposed mill at The Pas could be converted to produce unbleached Kraft pulp again if market conditions changed.

Technologically, the existing mill process at The Pas is out of date. Although this process is still economical, state-of-the-art mills, such as the proposed upgraded mill - are in many respects - environmentally much cleaner. In terms of the contract for the sale of Manfor by the Province of Manitoba to Repap, both parties are committed jointly to clean up and rectify a number of environmental problems which currently exist at the mill site.

Phase I alterations include conversion of the plant to produce bleached Kraft pulp, upgrading of mill operational efficiency and environmental performance, and increase of production capacity from 400 to 500 air dried tonnes/day of pulp. Major changes to the mill would be to install a bleaching process unit and to convert paper production equipment to pulp drying and baling equipment. The rest of the process would essentially remain the same but would be renovated and upgraded.

DESCRIPTION OF THE PHASE I MILL CONVERSION (Cont.)

In response to a question, Mr. Richards said that with these changes, the mill will still be of small capacity relative to current industry standards, but will be economically viable and could be a successful stand-alone operation, independent of Repap's future plans such as Phase II developments.

Mr. Richards answered another question about alternative processes by explaining that there is no other proven technology available today that would produce the product that the Company wants. Other products can be made if chlorine is not used, but technology that could produce bright, white pulp without using chlorine is about 10 years away - in Mr. Richards' opinion.

The Pulping Process

Mr. Richards briefly described the pulping process. Wood chips are mixed with white liquor (process chemicals), put into digestors and cooked at high temperature and pressure to separate cellulose from lignin and resin acids in wood fibers. The result is brown pulp and black liquor (process chemicals and lignin). Brown pulp is further processed in a series of washing and bleaching steps to remove remaining lignin and other contaminants, with the end product being bright white pulp. Black liquor goes to the "liquor recovery cycle" to recover process chemicals.

About 12% of the pulp wood delivered to Repap at the mill will become waste. This includes waste from debarking, chip fines and rejects. Charred logs from a forest fire cannot be utilized for pulp production. Mr. Richards said that all waste wood (hog fuel) will be burned at the mill site to generate heat. Some solids may be landfilled.

Specific components of the proposed Phase I alteration were described by Mr. Richards.

DESCRIPTION OF THE PHASE I MILL CONVERSION (Cont.)

Woodroom, Digesters and Brownstock Washing

A larger woodroom, capable of producing more wood chips and handling larger logs, will be constructed. Better debarking facilities and new belt conveyors, installed to replace the existing pnuematic system, will deliver higher quality wood chips (i.e. less fines) to the digesters, at reduced cost. A new chip presteaming unit will also improve the quality of chips going into the digesters.

Existing digesters will be upgraded to obtain better heat recovery, and the facilities to collect odorous gas will be improved.

An existing pulp thickener will be converted into another brown stock washer, so that there will be 5 stages of brown stock washing instead of the existing 4 stages.

Delignification and Bleaching

Pulp will be bleached to a bright white colour using a chlorine bleaching process which will generate chlorinated organics in the process wastewater. Chlorinated organics are a complex class of contaminants, including chlorophenols, dioxins and furans and are, to varying degrees, persistent and/or harmful to the environment. Discharges of these contaminants to the environment are a relatively new focus of public concern and new regulations excercising more restrictive control are being proposed for implementation in many jurisdictions around the world.

Chlorinated organics in effluents discharged to the Saskatchewan River from the proposed Repap mill will be minimized through the use of new technologies, and are expected to be discharged at levels below anticipated

DESCRIPTION OF THE PHASE I MILL CONVERSION (Cont.)

stringent standards which are being developed for the regulation of such emissions in other jurisdictions. Dioxins and furans are predicted to be undetectable in treated mill wastewater, and Mr. Richards stated that concentrations in treated wastewater discharges of adsorbable organic halides (AOX) will be below 1.5 Kg/tonne of air dried pulp produced. Oxygen delignification and chlorine dioxide substitution technologies proposed for use in this mill are successfully utilized elsewhere to reduce the total chlorine requirement. Mr. Richards said that he knew of no other pulp mill using the same combination of technologies proposed by Repap. The issue of chlorinated organic emissions was further addressed by the Maclaren study team in their Environmental Impact Assessment.

The lignin content in pulp determines the amount of bleaching needed. Oxygen delignification will reduce the required quantity of bleach chemical needed in the mill by as much as 50%. A two stage washing process to remove lignin and process chemicals will result in a much cleaner brown pulp. These lignin removal techniques reduce bleaching needs to the extent that it is possible to use chlorine dioxide, a weaker bleaching agent but one that achieves bleaching with lesser amounts of elemental chlorine.

A new 5 stage bleach plant will be installed. At each stage bleach chemicals will be added and the pulp will be washed. Chlorine dioxide will be used in some stages, as a replacement for chlorine, to reduce the total amount of elemental chlorine used in bleaching. Within a few weeks of starting the new process, Mr. Richards expects that the plant can reach a rate of 50% chlorine dioxide substitution. After the process is operational, it can be fine tuned, and in perhaps half a year 70% substitution rates will be achieved. Substitution is limited to 70% because of quality considerations. Mr. Richards was unable to provide a specific timetable as to when the proposed substitution rates could be achieved.

DESCRIPTION OF THE PHASE I MILL CONVERSION (Cont.)

Pulp Dryer and Baling

The existing paper machine will be converted into a pulp dryer. New pulp cleaners will be installed, and pulp baling equipment will replace paper rollers. The paper machine is one of the biggest bottlenecks now limiting current production. The proposed pulp machine will be able to process 500 air dried tonnes/day, and this change is a major reason why the mill capacity will be increased by the Phase I conversion.

Liquor Recovery Cycle

The liquor recovery cycle removes sodium hydroxide and sodium sulphate from black liquor so that the chemicals can be reused in white liquor. The cycle starts after pulping. Weak black liquor from the digestors (about 15% solids) is dewatered in a series of evaporators until the solid content of the strong black liquor is about 50%. A new, non-contact evaporator will then be used for further dewatering to get a black liquor with 70% solids content.

The 70% solids black liquor is fed into in the recovery boiler, burning off the lignin and leaving green liquor. Green liquor is recausticized to reform white liquor. The burning of lignin in the recovery boiler will generate almost enough heat energy to run the entire plant.

Presently, sulphur contained in the black liquor is lost in various forms to recovery boiler flue gases vented to the atmosphere through use of direct contact cascade evaporators. Installation of a new non-contact evaporator would eliminate up to 90% of the total reduced sulphur (TRS) emissions presently released. This will significantly reduce odours currently experienced in The Pas. A new electrostatic precipitator will reduce particulates emitted from the recovery boiler by about 60%.

DESCRIPTION OF THE PHASE I MILL CONVERSION (Cont.)

Waste Treatment and Disposal

New clarifiers installed to improve mud removal (calcium carbonate) in the liquor recovery cycle will reduce the solid content of wastewater. Additional aerators will be installed in the wastewater treatment lagoons to reoxygenate and improve effluent quality. Treated effluent will be discharged into the Saskatchewan River through a multi-port diffuser that will achieve rapid mixing of effluent with river water, thus minimizing downstream impacts. This change to the method of wastewater discharge was more fully described by the MacLaren study team (see page 34).

Other improvements to the mill that Repap will implement include the incorporation of improved treatment of domestic sewage wastes, upgrading of petrochemical storage facilities, construction of a properly engineered landfill site, the burning of non-condensible gases to reduce sulphur emissions, and reduction of power boiler emissions.

Equipment Reliability

In response to questions, Mr. Richards said that unanticipated failure of equipment could occur, but Repap was confident the equipment selected for the proposed alterations was reliable. For major purchases, Repap not only investigates the credentials and reputation of the manufacturer but also visits mills that have the equipment installed to discuss actual reliability experience with operators. Mr. Richards has personally visited about 2/3 of the pulp mills in North America, and has had considerable contact with other plant operators. He was confident the equipment that will be installed in The Pas would be proven and reliable.

DESCRIPTION OF THE PHASE I MILL CONVERSION (Cont.)

Development of a Contingency Plan

Repap is committed to multi-agency planning and the development of response programs to cope with emergency situations arising from spills or process upsets. Mr. Richards said that these plans had not yet been developed as this would involve the consideration of many different emergency situations and discussion with appropriate local officials.

There is an emergency spill basin located at the pulp mill site with the capacity to hold 22 hours of process overflows. Mr. Richards said that there is additional excess capacity within the process to store flows at various points such that, in combination with the spill basin, any process upset can be stored within the mill and not discharged directly into the environment.

Employment and Training

The construction period for Phase I is expected to last about 17 months, at a total estimated cost of $338 million. Depending on construction schedules, there could be a maximum of 800 workers hired at any one time during the construction phase. Most of these short term positions will require skilled workers. Repap has no plans to train workers for the construction phase. Mr. Richards said that Repap would try to give first priority to hiring locals, subject to agreement with the construction worker unions. Repap will purchase from local suppliers if they are competitive with respect to price, delivery and quality.

Phase I will not provide many new, permanent positions at the mill, but Repap will ensure that no jobs are lost as a result of alterations. New positions arising over the next few years will require technical knowledge and training. Repap prefers to hire local people because of the long term

stability this provides, and has earmarked $1 million to train local graduates. There are ongoing discussions with Keewatin Community College about how these future training requirements can be met. Mr. Richards said that Repap would like to have greater participation from Native communities in future operations. An additional $4 million has been earmarked to train existing workers to operate the new equipment and processes in the altered mill.

Recycling at the Repap Phase I Mill

Although Repap intends to recycle waste pulp generated within the mill, as much as possible, Mr. Richards stated that post-consumer paper wastes could not be recycled into the high grade bleached pulp produced at The Pas. Post-consumer waste paper contains inks and other contaminants that must be removed to obtain the degree of brightness Repap intends to produce. The length of fibre, one characteristic that determines pulp quality, cannot be maintained when waste paper is introduced into the feedstock for two reasons. First, repulping breaks fibres, creating shorter fibres, and second, fibre length in many waste papers is shorter than that sought by Repap. Introducing recycled fibre into the pulp produced at The Pas would cause problems.

Mr. Richards acknowledged that recycling is an important part of the paper industry and it is growing in importance. Repap, however, is not involved in the recycling industry. Recycled fibres should be introduced into final products at the paper making stage, not into raw pulp. In addition, because of the economics of transporation, paper recycling plants need to be located close to major sources of supply and markets. In this respect, a paper recycling plant in The Pas would be uneconomical. Mr. Richards said that recycling is a broad industry and social issue, and it would be unfair and unreasonable to force a single firm to set up a recycling plant.

DESCRIPTION OF THE PHASE I MILL CONVERSION (Cont.)

Overview

Mr. Joe Kass, the Vice-Chairman of Repap Enterprises Inc. provided an overview of the Company's plans. He described Repap as a medium sized Canadian company that has focused on producing high quality coated paper and Kraft pulp since 1973 when it first started in northern Quebec.

Presently Repap operates a pulp mill in British Columbia, a coated paper facility in Wisconsin, and an integrated pulp and coated paper operation in New Brunswick. Mr. Kass said that it was logical for Repap to produce pulp in The Pas because the large operation in Wisconsin is a major buyer of pulp, and is close enough that pulp can be economically transported there.

In the long term, Repap would be looking at producing paper in The Pas, but Mr. Kass was not certain whether the product would be coated paper or some other grade of paper. He described coated paper as the glossy paper used in magazines, catalogues and other advertising materials. The coated paper market has tended to grow with the economy and demand has been solid.

Most of the coated paper produced by Repap is sold in North America, although the Company is starting to market some of the New Brunswick paper offshore. Pulp from New Brunswick and British Columbia is sold heavily into world markets, and Repap is now one of the largest exporters of pulp to Europe.

Pulp from The Pas, located in the middle of the continent, will be marketed mostly in mid-America. Mr. Kass said that Repap has seriously looked at the possibility of shipping out of the Port of Churchill. The big problem was the short 3 or 4 month shipping season. Most customers today do not want to maintain a large inventory - they want small deliveries every week or two.

A Repap strategy has been to acquire assets that have not been very successful in the past, bring in an entrepreneurial emphasis and make the new

asset successful in the long term. They look to see whether the product line should be changed to something more in demand, whether the operation should be expanded to get economies of scale, or whether they should develop an integrated process.

Timing is very important, and Mr. Kass said that now is a good time to expand the Kraft pulp business. However, because of the huge amount of investment required, this strategy requires a very long term commitment. Repap has to anticipate future changes in market supply and demand.

Long term planning requires that the technology used be up to date and sophisticated. Repap has investigated technology used in Europe, North America and Japan to find the most modern tested equipment. Mr. Kass said with the equipment Repap has selected, they expect the facility at The Pas to be second to none in terms of technology and environmental protection. They are aiming to have one of the cleanest pulp mills world wide.

A major focus of Repap is on the people working for them. Mr. Kass said there is a requirement for workers to know more and take on increased responsibilities when the mill and jobs are upgraded. Jobs will be technologically more advanced in the future, and more interesting. Previous experience and training is not essential because Repap will provide the necessary training.

Repap's plans will have a significant economic impact on the community. This impact will affect not only the Town of The Pas, but a large area around the Town, and will create stability over a long period of time.

Mr. Kass strongly endorsed suggestions that had been made in earlier presentations for the formation of a citizen advisory group to review environmental aspects of Repap's mill operation in The Pas. A similar group

in New Brunswick has been active for about a year, and in Mr. Kass's opinion, was fulfilling a real and necessary function.

The Environmental Impact Assessment

The Environmental Impact Assessment for the Phase I modification and expansion of the (former) Manfor Complex was prepared by MacLaren Plansearch Inc. of Winnipeg. MacLaren enlisted the expertise of individuals from Beak Consultants Ltd., based in Brampton, Ontario, from Intergroup Consultants Ltd., based in Winnipeg, and from Cantox Inc., based in Toronto, to work as study team members in specific areas of the Environmental Impact Assessment.

Key-person interviews and six Open Houses in the communities of The Pas (2), Swan River, Thompson and Winnipeg (2) were undertaken as part of the assessment process and to facilitate dialogue with members of the public.

Mr. Michael McKernan, Project Manager and Principle Scientist, from MacLaren Plansearch Inc. Winnipeg, described the procedure used to keep the public informed. First, there was early disclosure of significant results and new information at the earliest possible juncture. Second, all documents were sent at the request of any person or group. Third, communication was made to every person or group requesting discussion and feedback on the contents. In addition, the Manitoba Environmental Council and the Manitoba Naturalist Society provided feedback on the project.

Characterization of Waste Streams and Their Discharges

Mr. McKernan explained that three areas of waste discharges were dealt with in the Environmental Impact Assessment: wastewater, solid waste and air emissions.

EIA - CHARACTERIZATION OF WASTE STREAMS (Cont.)

Wastewater

All water supply for the mill comes from the Saskatchewan River at the present time and is pre-treated for a number of uses within the mill. Wastewater streams are generated at several points in the plant and are eventually channelled into two separate wastewater sewers (organic and high suspended solids) and treated separately.

Mr. Derek Elion, Technical Manager of Industrial Waste Treatment with MacLaren Plansearch Inc., Toronto described in detail the sources and types of wastewater discharges from the proposed development.

Raw water from the Saskatchewan River is pre-treated and used for the mill's basic water supply and for a number of utilities related primarily to steam generation. For the mill's basic water supply, the water is treated with lime to soften it and then filtered to remove suspended solids. Prior to use for steam generation, water must be treated to remove dissolved solids. Primarily sulphuric acid and caustic streams are generated and regenerated periodically for this treatment and ultimately discharged to the sewer.

Wastewater streams are generated in the wood room, digestion area, drying area and machine room. The wood room, because it uses a dry debarking operation, produces only a small amount of wastewater used to wash down the log deck.

Effluent from the digestion area consists of discharges of condensate containing organic materials and some fibre or other reject material from the pulp cleaning system (e.g. sand, corrosion products). Effluent from the drying area and machine room is generated when pulp is dewatered before drying.

The mill requires some cooling water, for use mostly in the summer. Cooling water does not come in direct contact with the process systems and

therefore does not contain any substantial amounts of contaminants. After use, cooling water will be discharged to the river separately from the treated process wastewater. During the winter, the proposed development will re-use the cooling water in the mill for process purposes.

Organic effluent will be produced in the proposed five stage bleach plant. The bleach plant will have four towers sequenced in such a way that each bleaching stage will be followed by an extraction stage. The bleaching stage will produce an acidic effluent, while the subsequent extraction stage will produce an alkaline or caustic effluent. The alkaline and acidic streams will be eventually combined and neutralized with some of the lime sludge generated from the water treatment system and some of the excess lime from the recovery recaust area.

Process wastewater streams are eventually channelled into either the organic or high suspended solids wastewater sewers. The high suspended solids wastewater stream requires physical separation in a clarifier. Mr. Elion said that the proposed development includes the upgrading of the existing clarifier. Waste solids or sludge generated at the bottom of the clarifier will go through a coil filter for de-watering. Most of the clarifier sludge generated is of an organic nature and is combustible.

Wastewater carried in the organic sewer contains organic materials extracted during the bleaching operation which cannot be recycled back into the mill operation. Treatment of the wastewater will take place in a series of mechanically aerated basins or lagoons.

The mill's existing settling ponds will be decommissioned and converted into an expanded and aerated lagoon system designed to accommodate the greater organic load and increased flow resulting from the mill's proposed modifications. The role that the settling ponds originally played in removing

solids will be taken over by a new primary solids removal system, the clarifier, and a number of in-plant primary recovery systems that will be installed.

In order to determine lagoon requirements for secondary treatment of chlorinated effluent, Mr. Elion examined mills, primarily in Ontario, that either had relevant data on the amount of chlorinated material going into similar treatment facilities or had similar processing operations. Increased aerated lagoon capacity in the order of 45 million litres will be added to the roughly 318 or 327 million litres existing treatment capacity. The expanded lagoons should then provide a retention time in the order of 6 1/2 to 7 days with an average flow rate of approximately 47,000 m^3/day. Mr. Elion said that in the industry, it is typical to have 5 to 10 or more days of retention time.

Nutrients, primarily nitrogen and phosphorous, will be added to the lagoons to increase rates of biological treatment of chlorinated and unchlorinated organic compounds. Mr. Elion elaborated on the system, saying that some of the organic compounds will be used by the bacteria as food, and other organic compounds will be volatilized into the air. Although removal varies in secondary treatment facilities, in general, they expect to remove in the order of 30 to 60 percent of the chlorinated organic compounds. Much of this removal occurs when particles, with chlorinated organic compounds adsorbed to them, settle out to the bottom.

Mr. Elion explained that solids settling to the bottom of the aerated lagoons (sludge) will be cleaned out at intervals of a number of years. This sludge may contain chlorinated dioxins, furans, chlorophenols or chemicals known to be dioxin precursors upon incineration. Mr. Elion indicated that the quality of the sludge, in terms of water content and the presence of chlorinated organics, will be determined before a decision is made to dispose of the sludge by burning or landfill.

EIA - CHARACTERIZATION OF WASTE STREAMS (Cont.)

The existing emergency spill pond at the mill has sufficient capacity to contain roughly 22 hours of process overflows. It will be retained to store any releases from the mill which would otherwise cause upsets in the biological system.

Although it is difficult to predict exactly the composition of wastewater, particularly after treatment, for the proposed Repap Phase I development, Mr. Elion stated that after treatment the final effluent discharged to the river would contain less than 2.5 kilograms of AOX (broad classification of all the chlorinated organic materials) per air dried tonne of pulp produced. At the point of introduction, the discharge of treated effluent to the river will not contain detectable amounts of chlorinated dioxins and furans.

Statements concerning the inclusion of furans together with dioxins as non-detectable should be understood in terms of toxic equivalents. Furans are less toxic than 2,3,7,8-TCDD. While the total quantity of dioxins and furans expressed in terms of 2,3,7,8-TCDD toxic equivalents is, as stated, expected to be less than the detection limit with existing protocols for 2,3,7,8-TCDD, the absolute quantity of some specific furans with low toxicity will be much greater than their toxic-equivalent amounts and will be above detection limits for those compounds.

Mr. Elion said there will be variability in the lagoon efficiency due to seasonal temperatures, and noted that 1988 data on the Manfor facility indicated there was a 65% reduction in removal efficiencies, as measured by BOD, in winter. In general, removal efficiencies are reported on an annual average basis that incorporate seasonal variations. This kind of reporting would not take into account phenomena (i.e. pickerel feeding in the mixing zone) occurring in winter months when efficiencies of the lagoons are at their lowest.

EIA - CHARACTERIZATION OF WASTE STREAMS (Cont.)

The wastewater treatment system will be in place when the Phase I mill begins operating. Mr. McKernan explained that, while the system will be in place, performance of the new technologies will be progressive during the initial start-up period. As a consequence, during this period, mill production and treatment processes may not achieve stated objectives.

Solid Waste

There will be a number of solid waste streams generated at the mill and a number of disposal routes. Combustible waste will be burned in the mill's power boilers which, in addition to the recovery boiler, produce steam for the mill.

Many of the solid waste streams will be landfilled in a newly engineered landfill. Mr. Elion clarified the term "engineered landfill", explaining that it refers to the capacity to control and monitor the leachate (water percolating through the landfill) at the facility, as well as the capping of the landfill after wastes are deposited. Mr. McKernan said Repap has had some difficulty in locating sufficient quantities of a clay with suitable porosity characteristics, and is now considering the use of impermeable plastic liners.

Mr. McKernan pointed out that the recommended monitoring program (Exhibit 5) addresses the integrity of the engineered landfill. Complete containment is recommended, with sub-surface monitoring wells installed to detect leachate movements.

General refuse, such as office and cafeteria wastes, will likely continue to go to The Pas landfill. Solids from the domestic sewage treatment facility will be disposed of in the sewage treatment facility in the Town of The Pas.

EIA - CHARACTERIZATION OF WASTE STREAMS (Cont.)

The aerated lagoon system will produce sludge that will have to be periodically removed, dewatered and either incinerated or landfilled. Solids removed by the clarifier will be dewatered in a new system and used as fuel for the boilers.

Equipment in the mill that contains PCBs will be taken out of service and decommissioned over a period of time and stored on site. A storage facility will be built to hold these particular wastes.

Finally, building materials containing asbestos will be removed from service on an ongoing basis and replaced with more modern materials. There will be a separate storage and handling facility in the proposed landfill system designed for asbestos waste.

Air Emissions

Mr. Tony van der Vooren, Toronto Coordinator and Group Manager of the Risk Assessment/Air and Water Environment Group from MacLaren Plansearch Inc., Toronto, gave evidence on air emissions from the proposed development and treatment technologies that will be employed.

Potential emissions from the bleached Kraft pulp operation and their sources include:

1. particulates, arising from the power boilers, recovery boiler and lime kiln;

2. total reduced sulphur compounds (TRS) (including hydrogen sulphide, dimethyl sulphide and dimethyl disulphide), arising

from the relief vents on the digesters, washers, recovery boiler, exhaust vent on the smelt tank, evaporators and lime kiln;

3. dioxins and furans, arising from the combustion process going on in the recovery and power boilers;

4. chlorine and chlorine dioxide, arising from the proposed bleach plant and the chemical preparation area; and

5. sulphur dioxide (SO_2), arising from the same sources as TRS, and the power boilers.

Chlorine and chlorine dioxide are the two new emissions that will be emitted from the converted plant. It was pointed out by Mr. van der Vooren that the new bleaching process will not add to air emissions of dioxins and furans.

An historical review of recommended emission guidelines and actual emissions at the Manfor complex over the 1977 to 1988 time period shows that they were frequently in exceedence of guidelines. In order to reduce emissions and come into compliance with guidelines, Repap proposes several major improvements, including:

1. replacement of the electrostatic precipitator on the recovery furnace to reduce particulate emissions;

2. upgrading the lime kiln scrubber to reduce particulate, TRS and SO_2 emissions;

3. conversion of the current boiler to a low odour boiler; and,

EIA - CHARACTERIZATION OF WASTE STREAMS (Cont.)

4. collection of gases from the evaporator vents, digester vents and the blow tank and their subsequent disposal through burning in the lime kiln.

Other improvements include the improved operation of the power boiler and the lime kiln, as well as the way in which materials are handled in the lime kiln. There will also be a scrubber added to the smelt tank to reduce TRS and SO_2 emissions.

Mr. van der Vooren emphasized that built-in conservatism was adopted when estimating emissions from the new development by using the higher numbers reported in the literature when ranges were indicated. Overall emission improvements include a 52% improvement in particulate emissions (from 123 grams/second to 59 grams/second) and a 97% reduction in the quantity of TRS emitted.

Increased production and increased steam requirements will put more load on the power boilers with a corresponding increase in the use of Bunker C oil. If all increased demands for additional fuel are met with Bunker C oil, there will be a 90% increase in SO_2 emissions. If, however, increased fuel demands are met exclusively with hog fuel, there will be a net reduction of SO_2 emissions by about 50%. Based on the worst-case scenerio, there would be an overall increase in SO_2 emissions from 800 tonnes per year to 1,500 tonnes per year.

The proposed TRS emissions from the smelt dissolving tank (as a measure of black liquor solid) is also expected to be double the current Manfor guideline. Mr. van der Vooren explained that this guideline of 0.0084 parts per million (ppm) was recommended initially by the United States Environment Protection Agency (EPA), but has since been found to be unachievable. The EPA now recommends a higher guideline of 0.016 ppm, closer to the emission level expected from the new mill.

Ecological Impacts of Air Emissions

Methodology used in Assessing Impacts

The methodology used to assess the ecological impacts from airborne emissions of the proposed development was described by Mr. van der Vooren. In general, a computer simulation was used to produce a model of air dispersion around the mill. The results of dispersion were used for two purposes: one was a comparison with Ambient Air Quality Guidelines set either by the Manitoba Department of Environment, or the Governments of Ontario or Canada; and the second was to provide input for a subsequent assessment of ecological impacts at specific sites located near the plant. The air dispersion model used was developed by the U.S. EPA and is called the Industrial Source Complex. This particular computer model can be made very site specific because local data can be incorporated into the analysis. Mr. van der Vooren added that a time factor for equipment outages or downtime was not factored into the model.

Parameters fundamental to the model include wind speed, wind direction and a measure of vertical dispersion. Other inputs include a site description (emissions inventory) and a description of the surrounding area. Twelve specific locations (receptor sites) surrounding the plant site were selected. These included sites where people lived and could come in contact with the plume. Results of the modelling were given in two forms: one-hour and 24-hour average exposures. Hour-to-hour meteorological data for the representative year of 1983 were incorporated into the model to determine how much dispersion there would be over an hour. For determining longer term impacts, seasonal and annual wind and meteorological data averaged over the 1978-1987 time period were used.

In the past, the Manfor operation emissions exceeded, on a fairly regular basis, the particulate and TRS guidelines set by Manitoba Department

of Environment. Comparing the modelled emissions and the ground level concentrations predicted for the Phase I mill to Ambient Air Quality guidelines, the maximum TRS emission predicted is 50% of the guideline; SO_2, 10% of the guideline; chlorine, 1% of the guideline; chlorine dioxide, 10% of the guideline; combined dioxins and furans, 0.1% of the guideline. There is predicted to be some minor exceedences up to 5 hours/year of the particulate air quality guidelines for maximum one hour concentrations.

Process upsets (e.g. shut downs of pollution control equipment) could lead to exceedences of guidelines. Although the exceedences would be higher than guidelines, they would be below levels that would cause any health concerns.

Effects on Plant Life

Mr. McKernan discussed the ecological effects of the dispersion and quantity of gas emissions on plant life surrounding the mill. Different plant species have different exposure sensitivities that vary according to the type of gas, the concentration of the gas and length of exposure.

One of the constraints encountered in estimating impacts of gas emissions on plant life for the E.I.A. was the lack of data for sensitivities of local native plant species. This paucity of information constrained the study team's ability to estimate implications for the vegetation component of wildlife habitat. Sensitivities for local vegetation were extrapolated from existing information on related species and evaluated in terms of emissions predicted for current and proposed Phase I conditions.

With respect to SO_2 emissions, the literature indicates that exposure to a SO_2 concentration of less than 16 micrograms per cubic meter

EIA - ECOLOGICAL IMPACTS OF AIR EMISSIONS (Cont.)

(ug/m^3) over the summer growing season would be sufficient to protect against any foliar injury. Under current conditions, the highest level predicted close to the mill is 12 micrograms per cubic meter. Under Phase I conditions, the highest concentration close to the mill is 2.6 ug/m^3. SO_2 emissions received at ground level are predicted to occur in concentrations that provide margins of safety for all plant species. Wildlife habitat will not be affected by SO_2 emissions.

A concern was expressed regarding accumulation of SO_x in snow over the winter with spring run-off of this "acid snow" entering the river. Mr. McKernan said that, because there will be very low levels of SO_2 emitted, this would not present a problem.

With respect to chlorine, much of the available vegetation sensitivity knowledge has come from accidental exposure data. Of the concentrations predicted at the twelve receptor sites around the mill, the maximum predicted one-hour concentration that would be received at ground level is 2.3 ug/m^3. This is in comparison to the one-hour air quality criterion of 270 ug/m^3. Similarly, the maximum 24-hour concentration predicted to be received at ground level is 0.6 ug/m^3 in comparison to the 24-hour air quality criterion of 150 ug/m^3. Predicted concentrations are also orders of magnitude less than concentrations reported in the literature as causing impacts. However, definitive species sensitivity information is not available for every species.

In general, using existing data, the trend identified was that there is no basis for predicting any effect of the emitted atmospheric gases on locally occurring vegetation. Mr. McKernan added that there is a recommendation in the monitoring program to moniter ground-level concentrations of the emitted gases.

EIA - ECOLOGICAL IMPACTS OF AIR EMISSIONS (Cont.)

Effects on Wildlife

The kinds of wildlife exposures that can result from the proposed facility operation pertain to air emissions deposited on the soil and vegetation and then subsequently ingested with vegetation or water. Sensitivity information could not be utilized in this case because of a lack of empirical studies. The study team used an alternate inferential approach to determine the implications for wildlife from the most potentially hazardous material emitted: the chlorinated dioxin 2,3,7,8-TCDD. The surrogate test used was to review the results of a study of the effect of lagoon sludge from a bleached Kraft pulp mill in Wisconsin that was spread in a series of experimental forest plots. This sludge contained 79,000 parts per billion (ppb) of 2,3,7,8-TCDD.

Observations made with respect to the Wisconsin test were: 2,3,7,8-TCDD was taken up by a number of biota present in the test plots; the residual concentration in the soil was 11 parts per trillion (ppt); and, the concentrations found in a variety of exposed animals ranged from 2 to 18 ppt. The Wisconsin researchers concluded that the range of concentrations reported in animals had no adverse impacts.

For the Phase I conversion, it was predicted that annual soil deposition would average 4×10^{-5} ppb of 2,3,7,8-TCDD. This is in favourable comparison to the 79,000 ppb of 2,3,7,8-TCDD in the sludge used in the Wisconsin test plots, and with the Canadian Council of Environment Ministers guideline for soil concentrations of 2,3,7,8-TCDD of 1 ppb. Based on these comparisons, it is the opinion of the study team that there would be no adverse effects on wildlife from predicted Phase I levels of dioxin air emissions.

Ecological Impacts of Wastewater Discharges

Impacts on Water Quality

Mr. McKernan explained that bleached Kraft pulp mill effluents can have a variety of impacts on water quality that pertain to the discharge of conventional (non-persistent) and non-conventional (persistent) compounds. Depending on the length of exposure and concentration, pulp mill effluents have the potential to:

1. cause depletion of dissolved oxygen in the river;

2. cause acute lethal or chronic sub-lethal effects on aquatic biota;

3. give rise to human health risks from ingestion of contaminated fish or contaminated water; and

4. impair the taste, texture or odour of fish flesh or drinking water.

Background concentrations in the river of constituents to be regulated (excluding chlorinated organics) were determined. For the first 30 km downstream of the mill there is no community using the river as a drinking water source. The water is not very potable - it is very high in turbidity, high in suspended solids, occasionally high in sodium, it has colour problems and has high alkalinity. The river is well oxygenated.

Impact studies were conducted before Manfor put in an aerated treatment facility in 1979. These studies found a reduction in total numbers and diversity of invertebrate river populations caused by Manfor discharges. Studies conducted in 1988 indicate there are still residual impacts on aquatic

invertebrates in the area downstream of the outfall. There has, however, been a dramatic improvement in the quality of the benthic environment.

The increases over background levels of conventional contaminants present in the river, that would occur after the discharge has been received and diluted, were calculated for two scenarios: the 7-Q10 low-flow (lowest average seven days on a 10 year return frequency) which was found to allow 300 dilutions of effluent in river water, and under average flow conditions. The predicted incremental increase of contaminants over background levels were found to be of a very low magnitude and, in the opinion of Mr. McKernan, did not represent any impairment of potential for other uses. The conventional parameters considered in this assessment (BOD, TSS, phophorous, nitrogen, and sodium) potentially could cause only transient, short-term impacts. Effluent discharge will not cause a significant decrease in levels of dissolved oxygen in the river.

For non-conventional contaminants (e.g. chlorinated organics), the concern is for impacts on aquatic biota including fish and human health for people eating fish. Mr. McKernan said these concerns are relatively new and the regulation of chlorinated organics is still developing along with research to help define safe levels. As these regulations evolve, there has been a trend towards greater stringency in allowable discharge concentrations.

Levels of effluent quality that may be achievable are being considered in Ontario under the Municipal Industrial Strategy for Abatement (MISA). These levels would provide a phased-in discharge improvement schedule for pulp and paper mills in the future. Repap has committed itself to achieving Level IV standards for discharges under the MISA program, the most stringent effluent quality guidelines proposed, which likely will not become regulations in Ontario until 1993 or 1994. This level of effluent quality is similar to targets being set in other provinces and countries over the same time period.

EIA - ECOLOGICAL IMPACTS OF WASTEWATER DISCHARGES (Cont.)

Effluent quality levels that Repap has committed itself to are:

1. concentrations of AOX will be less than 1.5 Kg/air dried tonne pulp (ADT);

2. zero lethality in fish (i.e. 100 percent fish will survive a 96 hour exposure test in 100 per cent effluent);

3. no sub-lethal toxic effects beyond the mixing zone;

4. BOD less than 30 Kg/ADT;

5. Suspended Solids less than 10 Kg/ADT:

6. dissolved oxygen will receive a high level of protection.

The array of process modifications that Repap will install are designed to achieve these stated objectives for environmental protection. Oxygen delignification is considered by authorities to have an appreciable capacity to reduce fish lethality. Chlorine dioxide substitution is considered to have some variable results in protecting against effects in fish. Secondary biological treatment has the capacity to reduce acute lethality and the chronic sub-lethal effects appreciably, both because AOX compounds degrade and because many of the more toxic chemicals are virtually insoluble in water and adsorb to particles in the detained effluent and settle out. Secondary treatment efficiencies depend on the length of residence time.

Dilution of the final bleached Kraft mill effluent is needed to preclude fish tainting and other sub-lethal effects. In comparison to using the existing outfall location on the rivershore, Repap will install a submerged outfall located in the middle of the river fitted with a 20-to-1 four-port diffuser, approximately 30 metres long. The term 20-to-1, used to

describe the diffuser, means that for every unit of treated discharge contained within the pipe there is an instant mixing with 20 units of available river water. Effluent flowing out of the four ports is instantly at 20 dilutions in river water. The ports are inclined laterally, such that they are in the same planes as the flow and the angle of the port is slightly inclined to the vertical to preclude driving the water column down, which could cause bottom scouring.

With a multi-port diffuser installed, a 20-to-1 dilution of effluent was predicted. A further 80 dilutions would be achieved within about a metre of downstream flow along the length of the diffuser pipe. Based on this new technology and outfall location in the river, the predicted surface area of the mixing zone needed to provide 100 dilutions is 36 square meters (m^2). This is in comparison to an existing mixing zone of 70,000 m^2 of river area.

Experience with seven American bleached Kraft pulp mills has shown that a minimum of 100 dilutions of effluent into the river are required to prevent fish tainting. Although these mills released higher concentrations of AOX than the proposed mill, it was thought possible by Mr. McKernan that if fish should linger within the 36 m^2 mixing zone and thus be exposed to 20 to 100 dilutions over a period of time, they may become tainted.

Acute toxicity will not occur in the mixing zone or river because even undiluted effluent will cause zero mortalities over 96 hours.

The seven American mills released an average concentration of 20 ppq 2,3,7,8-TCDD. It is predicted that dioxins and furans will be undectable in Repap Phase I treated effluent, but 20 ppq was considered as a worst case scenario. A protective criterion in water of 0.2 ppq 2,3,7,8-TCDD was recommended in a study recently completed by MacLaren Plansearch Inc. for the Ontario Government. This limit is recommended to protect aquatic life, including fish eating animals, from chronic sublethal effects. Worst-case

scenario concentrations of 20 ppq 2,3,7,8-TCDD discharged would be reduced to the protective limit of 0.2 ppq by 100 dilutions, within the 36 m^2 mixing zone. Mr. McKernan concluded that there will be no implications for dioxin hazard to aquatic life.

Solubility of dioxin in water has been measured in the laboratory to be as high as 20 ppt. Dr. Willes stated that in a natural water system, there will be an apparent lowering of this solubility because of the extreme affinity of dioxins and furans for particulate matter found in river water. The extent to which these chemicals will exist in solution cannot be predicted at this time, but will depend on the characteristics of the river and the kinds of particles naturally present. It is expected that a substantial proportion would be associated with suspended solids. Because the dioxins and furans associated (adsorbed) with particulate material are much less biologically available than freely dissolved chemicals, the effective level in the water will be less than the stated load in the wastewater stream.

Recent studies by the Saskatchewan government on dioxin emissions from the Weyerhauser pulp and paper mill upstream of Prince Albert on the Saskatchewan River showed that levels of 2,3,7,8-TCDD in fish (whole suckers, walleye fillets, minnows, shiners) varied from undetected concentrations to a high of 8 ppt. This is in comparison to the protective criterion in fish proposed by Health and Welfare Canada of 20 ppt and that of the State of New York criterion to protect aquatic life of 3 ppt. In respect of the fact that the proposed Repap Phase I mill will employ a fuller array of modern technologies than the Prince Albert mill, the proposed mill should not generate levels of dioxins that contravene the protective criterion in fish proposed by Health and Welfare Canada.

From a fairly general perspective, a level of 20 dilutions (20-to-1) will protect against sub-lethal effects (e.g. impaired growth in fish or invertebrates, impaired reproduction). Prevention of tainting requires a 100

to 1 dilution. The 36 m^2 mixing zone is the only area that would be expected to have concentrations of compounds sufficiently high to cause tainting in fish. The presence of a thermal plume in the winter, along with nitrogen and phosphorus, have the capacity to stimulate various kinds of biological growth in the river. This could cause fish to be attracted to the diffuser and to linger within the mixing zone for a period of time. Tainting could become a problem if these fish leave the mixing zone and are captured soon afterwards by fishermen. Mr. McKernan pointed out that in the proposed monitoring program it is suggested that this problem should be further explored.

Organic Compounds in the River System

Mr. Gordon Craig, an Environmental Toxicologist with Beak Consultants Ltd., addressed the question of the dynamics of organic compounds in the river system after their release and dilution.

In the river system, biological degradation of all organic compounds, either chlorinated or not, will occur in the water phase. In this process, biological degradation of the organic compounds occurs when the naturally occurring bacteria begin to metabolize the compounds.

Biological degradation also takes place when these compounds come into contact with any bacteriological or biological solids in the water. In another process, river biota (e.g. insect larva in the sediment, etc.) take the compounds in and subject them to various enzyme systems and breakdown in the gut, or they can be sequestered into internal systems. Uptake of the compounds by river biota can take place directly from the water or through the food chain. Metabolism and excretion provide further breakdown of the compounds. Chemical processes, including hydrolysis and photolysis, are other methods of degradation. Volatilization, transfer from water to air, also occurs.

EIA - ECOLOGICAL IMPACTS OF WASTEWATER DISCHARGES (Cont.)

Degradation rates of the organic compounds will depend on several factors, including: actual concentration, beginning concentration, concentration of bacteria present, temperature, acclimation of bacteria and the compound's structural stability. Dioxins and pentachloraphenol are considered to be persistent, with the most toxic dioxin, 2,3,7,8-TCDD having an estimated half-life of at least 12 years. The typical by-products of the pulp and paper industry include chlorinated or unchlorinated dioxins, furans, phenolics, guaiacols, catacols and various resin and fatty acids. Most of these chemicals are not considered to be persistent.

Bio-concentration factors can be determined for compounds to express the ratio of the body concentration versus the water concentration. For the non-persistent, or unchlorinated compounds, very low bio-concentration factors (i.e. less than 100) are seen. In comparison, the persistent compounds can have factors thousands of times greater. The important principle is that water concentrations will be the important factor in accumulation. Body concentrations of a compound will fluctuate according to exposure concentrations or the intake rate. If the water concentration is sufficiently low, the body concentrations for any of the higher trophic levels will also be retained at a lower or no-effect concentration. When the body concentration is below the effect level, there will be no effect on the organism.

Outside of the 36 m^2 mixing zone, Mr. Craig said that the predicted effluent concentrations of chlorinated organics would be sufficiently low to protect against any effects in the remainder of the river system. Trace quantities of these organic compounds outside of the mixing area would degrade naturally.

Mr. McKernan said that the trace quantities of chlorinated organics carried downstream from the outfall would create a new chemical regime for an unknown distance where natural processes of accumulation and degradation will

occur. Degradation will occur at unknown rates, and there will develop at some point downstream an equilibrium condition between accumulation and degradation where metabolites and other intermediate degradation products will occur. There is a need to monitor for metabolites downstream, along with the downstream monitoring for chlorinated dioxins and furans.

Socio-Economic Considerations

Transportation Risk Assessment

Mr. van der Vooren discussed the risk associated with transportation of chemicals and their accidental discharge. The most dangerous of the new compounds to be brought on site because of Phase I modifications is chlorine.

The methodology used was to determine the overall probability of an accidental spill (or risk) involved in transporting hazardous material through the Town of The Pas. To determine the overall risk involved, several probabilities were determined. These included: the probability of a rail car passing through The Pas being involved in an accident, including collisions and derailments and regardless of whether it contained hazardous or non-hazardous materials; the probability of that rail car being a car carrying hazardous material; the probability of the hazardous material being released from that car; and, should such a release occur, the probability of harm from that release.

It was found that the risk of a rail accident that would lead to a release is about 1 in 9,000 years, the probability of a transportation accident causing serious harm is about 1 in 60,000 years and the probability of causing a death would be about 1 in 900,000 years. Based on these probabilities, the risk associated with transporting hazardous materials through the Town of The Pas was determined to be extremely low.

EIA - SOCIO-ECONOMIC CONSIDERATIONS (Cont.)

In response to a question, Mr. van der Vooren indicated that the incremental increase beyond the number of rail cars already carrying chlorine through The Pas would be 40, making a total of 80. He thought the probability of an accident too low to warrant a rail bypass for the Town of The Pas.

Human Health Risk Asssessment

Dr. Bob Willes, a Toxicologist from Cantox Inc., presented a human health risk assessment on potential exposures of human populations to the effluent and emissions from the proposed Phase I Repap facility.

Dr. Willes explained that human health risk assessments are based on the premise that the potential adverse effect to health by a substance is dependent on the dose of the substance received. The established methodology used in this type of assessment first involves the identification of site receptors (people exposed to chemicals) and the chemicals that they may be exposed to. The second step is to tailor the receptors identified and some of their characteristics to the particular site investigated (i.e. apply assessments directly to people in The Pas, for example types of food consumption, lifestyle, etc.).

The assessment then breaks down into two phases involving a hazard assessment and an exposure assessment. In the hazard assessment, a literature review is conducted to identify potential effects of the chemicals identified and to determine the level at which hazards are expected to occur. In the exposure assessment, an estimation is determined of the level of exposure expected in receptors (people). The last step is to determine the Relative Margin of Safety (RMOS) values by comparing level of exposure estimates with hazard limits for each chemical. A value less than one is calculated if the exposure estimate is below the hazard limit and a value greater than 1 is calculated if the level of exposure estimate is greater than the hazard limit.

EIA - SOCIO-ECONOMIC CONSIDERATIONS (Cont.)

In order to establish exposure estimates specifically for the project, all possible exposure routes had to be identified, as well as an estimate on how the materials would enter the body through these different routes. It was considered that the chemicals could be ingested either through drinking water, eating fish or by inhalation.

The assumptions associated with the drinking water were that the water would be taken directly from the river where there was a 100-to-1 dilution. The water would not be treated and a person would drink two litres of this water per day throughout a lifetime of 70 years.

It was assumed that the fish consumed had lived their entire life in the 100-to-1 diluted effluent and the people consumed one or two 8 to 10 ounce meals of fish per day seven days per week throughout a lifetime of 70 years. It was assumed for this project that 100 per cent of the contaminants were absorbed (bioavailability), although it is very rare that 100% of the material ingested (or inhaled) is absorbed into the body.

For exposure estimates involving inhalation of some of the gases modelled in the plant gas emissions it was assumed that a person would be living at the highest exposure site and would breath 23 cubic meters of air, twenty-four hours a day for their 70 year life time. Absorption through other exposure routes was not examined.

By adding up a person's exposure under the stated conditions and dividing this figure by the body weight of the individual, it was possible to determine an estimate of the daily exposure this person would receive every day of their life (Lifetime Exposure Risk Assessment).

For inhalation exposure, modelled data for hydrogen sulphide, sulphur dioxide, chlorine and chlorine dioxide was used. With respect to chemicals in wastewater, data from the Smooth Rock Falls and Espanola Mills in Ontario were

used if one of two conditions was met: if the chemical was detected in the effluent samples of the two Kraft mills or if the chemical was not detected but was on the Ontario Ministry of the Environment MISA list that indicated that it is a chemical they are worried about. From this selection process, 57 chemicals were identified and analyzed.

Within the analysis, it was also necessary to look at the exposure one would receive from normal background levels present in the environment, from natural or man-made sources, and compare it to exposure levels from the proposed mill. Background data was used from a site comparable with The Pas. If there was no data available, background exposure was estimated to be zero. To ensure the exposure from the facility was not underestimated, the lowest measured values were used to represent normal background.

Genotoxic compounds cause damage to genetic material and cause cancer. For genotoxic compounds, there is no exposure level or threshold at which they do not produce some risk. Regulatory agencies and the scientific community involved in cancer mechanism research generally agree that there are exposure levels at which there are no health risks associated with dioxins and furans. There is, however, disagreement in the application of this information to a regulatory environment. Consequently, different countries may use different kinds of safety factors. Intake numbers vary between about 1 picograms/Kg body weight up to about 10 picograms/Kg body weight.

Dr. Willes presented information in support of a threshold level of risk for dioxins and furans. First, there is not a linear dose response relationship between the incidence of liver tumors in test rats and doses of dioxins and furans. Second, based on existing data, there is no increase in cancer in humans exposed to dioxins and furans. Third, these compounds do not cause mutations. Fourth, these compounds are found to be promoter agents (i.e. promote the development of tumors that have been initiated by something else), not initiating agents in the growth of some cancers. Fifth, one does

not see liver tumors in rats at low doses that do not cause changes in hormonal status or liver damage.

In general, there are no RMOS values from the facility greater than 1. RMOS values over 1 did occur when background exposure was added to exposure from the facility, for example, aluminium and 2,3,7,8-TCDD. In the event a RMOS value did fall close to 1 (i.e. between 0.2 and 2), the value was reassesed in terms of the estimates used in arriving at the figure. Taking into account the overestimations that were used in arriving at the figures, it is not expected that there will be any significant human health hazards from the operation of the proposed facility.

Dr. Willes pointed out that the exposure estimates are rather gross overestimates because no consideration was given for bioavailability (amount of exposure actually received or absorbed into the body) and that bioaccumulation is already addressed in the data. Therefore, he did not feel that there is a need for detailed monitoring of a large number of the substances. However, spot checking might be worthwhile for some substances of concern, for example, the dioxins and furans.

The Fisheries

Mr. McKernan discussed the implications to the commerical fisheries, which are mainly conducted a considerable distance downstream. In general, the predictions discussed earlier in this report indicated that there is no risk of adverse impact to fish beyond the 36 m^2 mixing zone at the outfall.

A comparison was made between the existing mill upstream near Prince Albert and Repap's proposed Phase I mill. The upstream mill, has a 40% chlorine dioxide substitution rate and is, in the opinion of the Saskatchewan government, causing only "modest or acceptable" impacts in the Saskatchewan

EIA - SOCIO-ECONOMIC CONSIDERATIONS (Cont.)

River. In contrast, Repap is committed to an initial level of 50% chlorine dioxide substitution rate and a longer term target of 70%. Based on the comparison, it is predicted that there will be no impact in resource harvesting opportunities as it pertains to the fisheries downstream of the Repap mill.

Mr. McKernan also referred to literature indicating that dioxin has not been detected downstream of bleached Kraft mills with secondary treatment facilities having in excess of 8 days hydraulic retention time. Mr. McKernan indicated that the Phase I Repap mill has been designed with 6.5 days retention time. The upstream mill has a shorter retention time.

Odour, Traffic and Noise Levels

Odour problems associated with pulp and paper mills are caused by TRS emissions. When historical Manfor and simulated Repap Phase I levels of TRS production and dispersion were compared, it was predicted that the change will be a reduction of TRS in excess of 90% and a significant reduction of odour. Subsequent work by Mr. van der Vooren indicated that people in The Pas would actually smell odours from the facility only from 0 to 80 hours a year following Phase I conversion.

With respect to traffic, the expected 25% increase in normal production capacity predicted for the Repap Phase I facility is predicted to be accompanied by a 20% increase in truck traffic. This increase is associated primarily with construction activities, deliveries of chemicals and pulpwood feedstock and shipment of products. On the basis of an agreement that has been reached between Repap and the Manitoba government to improve the infrastructure and maintenance of the roads, it is predicted that no adverse impact would accrue from increased traffic.

EIA - SOCIO-ECONOMIC CONSIDERATIONS (Cont.)

Noise levels are predicted to increase in association with the increase in rail and truck traffic. However, a slight net reduction in ambient noise is predicted at the mill site primarily associated with conversion of technologies, including the move from a pneumatic to a mechanical conveyance system for chip movement and switching from diesel to gasoline-powered vehicles.

Social and Economic Changes

Ms. Janet Kinley, a Consultant with Intergroup Consultants Limited in Winnipeg, spoke to the social and economic changes predicted to occur as a result of the upgrading and expansion of the facility at The Pas. Changes were analyzed in both the construction and operations phases.

The Department of Environment guidelines indicated that there were three areas required for a socio-economic impact assessment: the local economy; the local infrastructure and services; and, local community values. Three primary sources of change for local people (i.e. people living in The Pas and vicinity) were looked at: employment, increased business activity, and emissions and waste.

With respect to employment, incomes for local people will be generated. People from outside The Pas will also be brought in to fill positions not taken by locals which, in turn, will generate demand for infrastructure and services, and eventually, social change. Increased business activity will come from the purchase of goods and services and, if it brings in a small increase in population, will lead to demands for additional infrastructure and services. Ms. Kinley said that in terms of emissions and wastes from the facility, the initial concern is about changes in resource harvesting opportunities and in the quality of life in the community from changes in noise, odour and the health status of people.

EIA - SOCIO-ECONOMIC CONSIDERATIONS (Cont.)

The actual methodology used in the Impact Assessment involved an initial description of the project. Changes have been made since the initial project description used in the assessment: first, there have been changes in the time schedule and expected employment level; and second, an Agreement has been signed between Repap and the Manitoba Building Trades Council with regard to the rules concerning hiring and the use of local and Native people as a preference in the hiring for the construction phase. Specifically, this agreement states that the proposed construction site will be a unionized project. Hiring for the project will be done according to rules stipulating that a worker has to be a union member and must apply at a designated hiring hall. Preferences will be made to those living within 40 Kms of The Pas (within Manitoba boundaries) and to Native people within Repap's cutting area.

The next step in the assessment used published and unpublished sources of regional information. Key person interviews were conducted in The Pas and several surrounding communities to help identify new issues beyond those already identified. These interviews also provided an early indication of what people were feeling about the project. The last step in the assessment was a review of the experience in other construction projects, either from literature or personal contacts. Ms. Kinley pointed out that socio-economic impact assessments are generally less precise than scientific assessment. In many cases, only a direction of change can be identified.

Ms. Kinley first addressed the construction phase changes to the local economy in terms of employment and income, business and inflation. The 17-month construction schedule illustrates that, during the peak month, a total of 810 people are required. Over the peak six months, an average of 715 people are required. Over the entire 17 month schedule, one-half of all the jobs required are of the journeyman type and require certification of trade, meaning that the project requires a highly skilled workforce. In addition, only 1/5 of the tradespeople hired can be apprentices or helpers.

EIA - SOCIO-ECONOMIC CONSIDERATIONS (Cont.)

A demand/supply analysis was conducted for employment conditions in which the worker requirement was looked at in relation to the supply of labour that might be available to fill that demand. A comparison was then made to the experience at the Limestone Generating Station in which similar hiring preference clauses were in effect where about 20% of the workforce came from within the Preference area and the remaining 80% came from outside. However, because there are people in the north who are currently union members, there could be upwards of 30% to 35% of the workforce coming from within the Preference area for the Repap project. It is estimated that, of those hired by Repap from within the Preference area, about 90% (or 140 people) would be of Native ancestory. This estimate is based on job applications already received by Repap.

Labour income for the construction project was estimated to total about $26.2 million. Of this total, about $5.5 million in gross wages will go to people living within the Preference area. Re-spending of worker income within the local economy is estimated to be about $2.3 million. In general, residents of The Pas would tend to spend more of their income in the local economy than people living in the construction camp.

Short term or spin-off jobs (jobs created in the local economy as a result of increased business activities through re-spending of wages and direct purchases) are estimated in the order of about 145 jobs. These jobs would average about 6 months in duration.

Early projections placed the total cost of the project at $271 million, allocating about $140 million for the purchase of materials. Of this $140 million, Repap estimates that they can purchase approximately $5 to $7 million worth of materials (2% of the total cost) in The Pas and the vicinity of The Pas. These direct expenditures in the local area would include purchase of concrete, aggregate, lumber, office supplies, fuel and other materials.

EIA - SOCIO-ECONOMIC CONSIDERATIONS (Cont.)

A final point made by Ms. Kinley in terms of the economy relates to short term inflation in the cost of rental housing. Based on a current 1% vacancy rate in The Pas, it is estimated that there will be some inflation in this area. Concern in this situation is for people on a fixed or low income, for example, students coming to the Keewatin Community College from elsewhere in the North. It is possible that there may be some short term inflation in other communities and services as well.

Infrastructure and services is the second category of change analyzed. This analysis is particularly important for the town planning purposes of The Pas. There will be about 630 people in Repap's construction camp during the peak months of construction and, given normal circumstances, it is estimated that approximately 75 workers would bring their families with them. This would bring in approximately another 105 family members. In total, there will be approximately 810 in-migrants during peak months. Speculative in-migration is another source of population increase that may become an issue.

It is predicted that the 75 workers expected to bring their families will put an increased demand on the housing stock in The Pas and surrounding area. However, Ms. Kinley pointed out this is likely an overestimation because, faced with a shortage of rental accommodation in The Pas, workers may chose not to bring their families. In addition, this project is shorter in duration than those used for comparisons.

Based on key-person interviews, there appears to be a perception that there will be an increase in the demand for owner-occupied homes by residents of The Pas previously unwilling to invest in The Pas because of instability in the Manfor facility. A new sense of community stability was indicated in the interviews as a result of Repap taking over the Manfor mill.

It is also anticipated that there will be an increased demand for several services, including education, health care, law enforcement and

recreational facilities. The school system in The Pas is in a situation of declining enrollment, therefore, an increase in demand for this service is not anticipated to be a problem.

With respect to health care, the administration of the local hospital has requested funding for an additional physician for day time hours. These funds should be forthcoming. This physician would attend to more of the serious, emergency type situations. Repap will also provide on-site emergency facilities and two nurses when the facility is up and going.

Although the Repap construction site will have rules governing conduct and will provide a security force about 15 to 20 people at peak months, it is anticipated that there may still be some additional requirements for RCMP staff on a temporary basis and also for The Pas Indian Band police.

It is anticipated there will be increased demand on recreational facilities and programming in The Pas. A 5,000 square foot recreational facility will be provided by Repap at the construction site.

Land use was also considered an issue under town planning. The mill itself will not require new land. It is not clear whether there will be an increase in demand for residential land to build rental or owner occupied units. There is, however, ample capacity should this demand materialize.

The third area looked at in the assessment was local values, that is, changes to the way of life in the community during the construction phase. Five points were made with respect to this area. First, there will be a noticeable population increase of approximately 10%, comprised of a group of people demographically different from present residents. Second, a climate of stability was identified through key-person interviews. Third, there was a concern that project benefits (e.g. jobs, business) may bypass the Native community. Four, there will be an increase in traffic from construction workers, supply trucks and equipment hauling. Last, of the people

interviewed, two-thirds were in favour of the project and one-third were undecided.

With respect to the operations phase, the effects on the local economy, land use and local values were analyzed. During long-term operation of the new facility, it is expected that there will be an increase of about 10 to 30 new jobs.

In terms of population, no change is estimated. Based on other evidence given in the Environmental Impact Statement, there is no basis for predicting any change in resource harvesting activities in the local area. This was an important activity to look at because resource harvesting activities are very important in this area, including commercial fishing, domestic fishing, sport fishing, trapping, domestic use of muskrat, sport hunting, wild rice harvest, farming and investment in waterfowl habitat management.

In conclusion, no change in land use is predicted for the operations phase based on the results of the biophysical studies conducted. Although there will be a sense of community stability in this phase, there will only be a minimal change in direct operating jobs and no population change.

E.I.A. Monitoring

Mr. McKernan indicated that the study team did encounter data gaps in the conduct of the Environmental Impact Assessment which was based upon available data. Notwithstanding these data gaps, predictions of possible impacts were made. As a consequence, a proposed summary of an environmental and operational monitoring program was developed by MacLaren and submitted to the Environment Department. It is expected that Repap will continue to work with the Environment Department on the development of an appropriate monitoring program to collect needed information for identified data gaps and to confirm predicted impacts.

Independent Scientific Presentations

Dr. Lyle Lockhart, a Research Scientist with the Federal Department of Fisheries and Oceans at the Freshwater Institute, Winnipeg presented information to the Commission about chlorinated organic contamination of fish that has occurred downstream of other pulp mills. He discussed the present level of scientific understanding on how chlorinated organics are taken up by fish and the implications this has for fish health. The information discussed was based on both his own research and work conducted by others.

Dr. Lockhart and some of his colleagues recently collected young chinook salmon in the Fraser River system in British Columbia and analyzed the samples for chlorophenols, chloroguaiacols and polychlorinated dibenzodioxins (PCDD) and dibenzofurans (PCDF).

The base molecules of chlorinated organics are created in the pulping process when complex lignin molecules are fragmented. These base molecules are subsequently chlorinated in the bleaching process. Chlorinated dioxins and furans, described by Dr. Lockhart as being extraordinarily toxic, are created in a number of forms because of the many possible combinations of where and how many chlorine atoms can be bound to the base molecule. Chlorophenols and chloroguaiacols come in fewer forms because there are not as many possible combinations of chlorine attachment. Different forms of chlorinated organics have varying and overlapping pharmacologies. Analytical chemists have great difficulty with them because it is hard to separate and measure each of the chemicals individually. Only one of these chemicals, 2,3,7,8-TCDD (tetrachlorodibenzodioxin), is regulated in Canada, with the limit set at 20 parts per trillion (ppt) in food consumed by humans.

Dr. Lockhart noted that several crab fisheries on the west coast of Canada have been closed within defined boundaries very near some older bleached Kraft pulp mills due to levels of dioxins detected in shellfish. Although circumstances were different on the west coast, Dr. Lockhart said that to avoid this potential problem, suitable monitoring of the Repap mill effluent and the river environment is needed to serve early warning.

INDEPENDENT SCIENTIFIC PRESENTATIONS (Cont.)

Young chinook salmon, in the Fraser River system studied by Dr. Lockhart, spend their first year after hatching in the river. They don't move around much during their first winter. After the "ice out period", they begin to migrate seaward, spend three or four years in the sea, and then return to spawn in the river system.

Dr. Lockhart collected samples of one year old salmon at the ice out period prior to their seaward migration. Results of the chemical analyses were:

- fish upstream of pulp mills had little or no (undetectable) contamination by the three groups of chlorinated organics studied.

- fish downstream had alarming levels of the three groups of chlorinated organics studied.

- levels of regulated 2,3,7,8-TCDD that were detected in the salmon were much higher than the limit of 20 ppt.

Dr. Lockhart concluded that fish were being contaminated by a source that lay somewhere between the upstream and downstream sampling sites. For all but a few of the contaminants, Dr. Lockhart was sure this source was pulp mills.

In addition to the sampling described above, Dr. Lockhart collected samples of fish livers. These were analyzed to determine the level of ethoxyresorufindiethylase (EROD). EROD is an enzyme present in the livers of humans and other vertebrates (including fish) associated in ways not yet understood with exposure to certain types of contaminants, including some of the dioxins and furans. It is known that EROD is one of a set of enzymes used to make insoluble compounds, like dioxins and furans, more soluble so they can be excreted.

INDEPENDENT SCIENTIFIC PRESENTATIONS (Cont.)

Based on reported incidences of similar findings, Dr. Lockhart expected to find elevated EROD levels associated with dioxin and furan contamination in livers from young salmon. He found that fish with high dioxin and furan levels captured at downstream sites had EROD levels at least fifty times higher than fish captured at upstream sites. This indicated that the fish are responding to a contaminant, but it was difficult to determine whether the fish were hurting or were just coping with their environment.

Dr. Lockhart pointed out that the relationship between EROD levels and dioxin and furan contamination is valuable in a monitoring sense. Although a few other contaminants also turn EROD on, EROD indicates there may be a problem with dioxin and furan contamination. EROD testing is considerably cheaper to conduct, and can be used to screen samples before deciding to conduct the very expensive dioxin and furan analyses.

Dr. Lockhart observed no evidence of fish pathology, such as tumors, in the salmon studied in the field. Under laboratory conditions, he exposed some salmon to effluent from one of the pulp mills on the Fraser River for several weeks. These fish survived and grew as well as the unexposed control group. Exposed fish also adapted well to being put in salt water, a difficult transition fish undergo in nature when they migrate out to sea. There is no reason at the moment to conclude that exposure to this effluent is terribly bad for the fish, said Dr. Lockhart.

Whitefish have been studied by Dr. Lockhart and by other researchers in the Peace, Fraser and Columbia River watersheds. Samples taken downstream of pulp mills were found to be contaminated with dioxins and furans, and often the levels detected exceeded the limit of 20 ppt for 2,3,7,8-TCDD. Fish captured upstream of the same mills had undetectable or very low levels of these contaminants. Downstream sediments are also contaminated. The implication is that dioxin and furans are coming from the pulp mills.

INDEPENDENT SCIENTIFIC PRESENTATIONS (Cont.)

Where EROD levels in whitefish livers were determined, a relationship between high EROD levels and high dioxin levels, similar to that found in young chinook salmon, was identified. Dr. Lockhart has mapped EROD levels in whitefish across western and northern Canada, and whitefish contaminated with dioxins consistently have significantly elevated EROD levels.

Dr. Lockhart knew of experiments conducted by Dutch scientists where carp were put into aquariums with sediments contaminated with PCDD and PCDF on the bottom. The contaminants were found to be transferred in some way from the sediments into carp livers. An increase in EROD levels was also noted in the contaminated carp livers. From these experiments, it was not clear if carp were eating the sediments, or if the contaminants were being transferred some other way.

In a laboratory experiment conducted by another researcher in Winnipeg, it was found that one form of furan put on food pellets was taken up and accumulated by rainbow trout. After several weeks, the same fish were fed clean food again. The trout retained the furans, excreting them very slowly. Trout fed high doses of furans had higher EROD levels in their livers than fish fed lower doses or the control group. Another study by an American researcher found that rainbow trout placed in water spiked with TCDDs and TCDFs were able to take up the contaminants directly from the water.

Dr. Lockhart pointed out that these findings are of concern because of the limit of 20 ppt of 2,3,7,8-TCDD in fish flesh. Research demonstrates that fish are able to take up and accumulate chlorinated organics from water, sediments and their food. Downstream from pulp mills that emit these contaminants, captured fish have been found to have, in some cases, levels above the regulated limit. This is a problem because it affects the commercial value of this biological resource.

Another concern that Dr. Lockhart discussed was whether chlorinated organic contamination hurt fish and whether it affected the continued viability of this biological resource. This is a difficult question to

answer. There seems to be toxic effects, but dead fish were not observed floating around during the field studies.

Some effects on growth have been reported in Swedish field studies. In Dr. Lockhart's laboratory studies, however, the fish exposed to effluent grew as well as the control group.

Laboratory studies in the United States demonstrated toxic effects of 2,3,7,8-TCDD dissolved in water. Rainbow trout mortalities were related to the concentration in water and to the length of exposure. Some mortalities were observed at concentrations in water as low as 38 parts per quadrillion (ppq) after a month of exposure. Behavioural changes in treated fish were also observed during these studies, for example not feeding normally, as well as some signs of fin erosion and of voiding feces with an unusual appearance.

Fish purge chlorinated organics from their systems slowly when they leave contaminated water. As contaminated fish grow in clean waters, the amount of contamination in their flesh is diluted by the new tissue that grows. These mechanisms are more likely to benefit migratory chinook salmon than whitefish that remain in contaminated rivers.

Dr. Lockhart said the critical thing is not the effect on survival or growth, but on reproduction. It is unknown what effect dioxins and furans may have on the reproduction of fish species found in the Saskatchewan River.

Work is now being done to relate the levels of contamination in fish from the Fraser River to concentrations in effluent and in river water. Dr. Lockhart did not have these figures available but he believed the measurements have been done. He also did not know what types of technology these mills employed, but said that most of the existing mills had been there a long time.

It is difficult to apply the results from the Fraser River to the Repap Phase I proposal without knowing what past levels of contamination salmon were exposed to. The fish populations Dr. Lockhart examined lived with

the contaminated effluents for many generations. Even if the levels now released from the studied mills are determined, amounts released in the past will remain unknown. Dr. Lockhart stated that with greater flows in the Saskatchewan River than in the Fraser River, the dilution ratio would certainly work in Repap's favour. He pointed out that, although dilution of effluent reduces the likelihood of toxic effects, there is still a large area where organisms can accumulate the contaminants.

Contaminated fish cannot be detected by fishermen unless the fish are submitted for analysis by a sophisticated laboratory. Some of the low-boiling phenolic compounds can taint fish to the extent that it can actually be tasted.

Scientifically, Dr. Lockhart said there is value in studying the introduction of chlorinated organics into the Saskatchewan River by the Repap Phase I mill because all of the mills studied to date operated for a number of years before any study of their effluents began. There is an opportunity here for a "before" and "after" study if baseline data is obtained before operation of the upgraded mill begins. To obtain baseline data, Dr. Lockhart suggested some of the monitoring could start a season before discharges started.

Monitoring program development was something that Dr. Lockhart believed should be done with the Provincial officials who know what species are present and their habits. Agreeing with Mr. Craig, Dr. Lockhart said that you can look at certain species as indicators of good health and the community of species as an integration of ecosystem health impacts from each of the contaminants released. Lower level animals that do not move around can be worthwhile indicator species to monitor, but species like walleye, whitefish, goldeye, etc. must also be monitored because they are consumed by humans. Movements of monitored species need to be known.

Beyond the need to monitor for health effects, Dr. Lockhart said there needs to be chemical monitoring. The level beneath which health is not impacted, the no-effect level at which regulatory limits are set, is invisible

INDEPENDENT SCIENTIFIC PRESENTATIONS (Cont.)

to the biological monitoring. Crab fisheries that were closed due to dioxin contamination were not detected because something biologically wrong was observed. Health agencies, understanding that these contaminants were objectionable, set the limit of 20 ppt 2,3,7,8,-TCDD, and levels in excess of this were subsequently detected by chemists, leading to closure of the fisheries.

Referring to the variety of compounds comprising chlorinated organics, and the fact that these compounds have different and overlapping pharmacologies, Dr. Lockhart noted that different mills and different technologies produce different mixes of the chemicals making up AOX. Compounds of the greatest toxicology or bioaccumulation are very small fractions of the total. The key is whether the new technology decreases the chlorinated dioxins and furans more than it decreases the total organic chlorines.

Solubility coefficients for dioxin are poorly understood. Dioxins are essentially insoluble, and tend to travel in the ecosystem adsorbed to particles or through living organisms. Uptake efficiencies by animals are much higher when dioxin is freely dissolved in water.

The insolubility of dioxin led Dr. Lockhart to question the results of the American study that observed some mortalities of rainbow trout exposed for a month to 38 ppq 2,3,7,8-TCDD dissolved in water. Dr. Lockhart said it is unclear if all 38 ppq were truly dissolved, or if some of the dioxin was present in a manner that was less readily available for uptake by trout. The implications of this led Dr. Lockhart to conclude that the chronic toxicity limit could be lower than that demonstrated at 38 ppq, such that science cannot rule out toxicological affects at 20 ppq, the worst-case scenario level for 2,3,7,8-TCDD in undiluted wastewater effluent from the Phase I mill used to predict impacts by the MacLaren study team.

INDEPENDENT SCIENTIFIC PRESENTATIONS (Cont.)

Dr. Eva Pip, an Associate Professor from the Department of Biology, University of Winnipeg made a presentation to the Commission. Dr. Pip believed there were some vital lapses in the information provided in the Environmental Impact Statement, and she stated that the implications of the Repap Phase I proposal should be examined much more closely. Dr. Pip questioned whether we needed bleached paper products for most of their intended uses, and pointed out that there is a very great environmental cost to using the bleaching process. She believed it was essential that a further, independent study should be done before the Phase I mill is licensed.

Many of the compounds in effluent from existing bleached Kraft mills have not been identified, nor has the toxicity of these compounds been determined. Even if they are introduced at very low concentrations, we should still examine the implications of releasing these compounds. Dr. Pip believes that despite the use of the diffuser, with the sheer volume of effluent that will be produced there will have to be some effect on the biotic community in the Saskatchewan River.

Dr. Pip raised concerns about the periodic bypasses of the wastewater treatment facility with direct discharge of untreated effluent into the river that were identified in the Environmental Impact Statement. She wondered how periodic and how voluminous these discharges might be, what environmental effects might occur, and how long it would take Saskatchewan River biota to recover from these untreated discharges.

Persistence of many of these compounds in the northern Manitoba environment is unknown, said Dr. Pip, and when they do degrade we do not know the toxicity of their degradation products. Some chlorinated pesticides are known to yield degradation products that are more toxic than the original compound. Dr. Pip felt it was more important to know what the effect of the effluent would be on the whole aquatic community, than it would be to know the exact chemical composition of the effluent.

INDEPENDENT SCIENTIFIC PRESENTATIONS (Cont.)

In terms of toxicity to fish, Dr. Pip said that some blanket statements were made by the MacLaren consultants. Seldom was the difference in toxicity to different species addressed, or that toxicity to a particular species varies according to age or the level of environmental stress experienced by fish. There were many assumptions made about the different species of fish living under the particular conditions in the Saskatchewan River. Dr. Pip said that this was an area where more information was needed.

With regards to toxicity tests on the mill's effluent, Dr. Pip believes they are not an invalid test, but in terms of monitoring, they do not give the whole picture. For example, the 96 hour testing period is very short in terms of looking for sub-lethal effects. For fish to die within four days, the effluent would have to be quite toxic. Furthermore, many carcinogens operate over long periods of time and subtle changes in behaviour, that might lead to reduced reproduction or resistance to disease or parasites, will not be recorded.

It was of concern to Dr. Pip that only fish were addressed in the Impact Statement. Many other types of organisms present in the river were not considered and there has not been an inventory of what species live there. Dr. Pip noted that invertebrate zooplankton were known to be more sensitive to heavy metals and many organic chemicals, and that these animals can be another important food source for fish. Aquatic plants and algae, another important component of the river food chain, are also known to be sensitive to organic pollutants. It would be pointless to consider how toxic the diluted effluent will be to fish if their food source disappears. Dr. Pip suggested that dominant organisms in the biotic community in addition to fish (e.g. mollusks, rotifers, etc.) should also be used as toxicity test organisms for ensuring effluent standards are met because, in many cases, these organisms are more sensitive.

Given the lack of data available for the Impact Assessment, Dr. Pip believes there was no real basis for making some of the predictions and it is

INDEPENDENT SCIENTIFIC PRESENTATIONS (Cont.)

hard to accept extrapolations as to the effect of chemicals in the mill's effluent. While Dr. Pip does not believe that the MacLaren study is invalid, she does believe there is a need to obtain some very basic information before Phase I modifications take place.

Dr. Pip noted that, because an inventory of the whole community composition of the Saskatchewan River has not been conducted, it is unknown if rare or endangered species are present in the river, or some other unique consideration that we may want to take steps to protect. Beyond a simple inventory, there is a need to know the community structure of both the aquatic and terrestrial ecosystems that will be affected by the Phase I mill, information such as the percentage species composition of the community, what are the dominant species and which are the sensitive ones, seasonal population shifts and succession. At the very minimum, field studies for one full seasonal cycle of the aquatic and terrestrial communities should be conducted.

Local Citizens

Ms. Carolyn Skrypetz, a local citizen of The Village of Mafeking made a presentation to the Commission. Ms. Skrypetz realizes the importance of the forest industry to the province, to herself and to her business, but feels that the main resource in the province is, and always will be, the human resource.

Ms. Skrypetz questioned the ability of Repap to recognize the importance of small communities in the area and wondered if the Company would provide opportunities to smaller operators, even if it caused more paper work and inconveniences. It was pointed out that if Repap opened a part time office in a village, it would allow local people to obtain information regarding Repap's cutting and logging plans and potential job opportunities. Ms. Skrypetz said that now is a good time for new ideas to flow back and forth, not only at the plant level, but also at the logging and reforestration level.

LOCAL CITIZENS (Cont.)

Mr. Jack Kennedy spoke as a citizen of The Pas. He believed that the Manfor acquisition by Repap was a positive move and that Repap's detailed plans to cope with environmental concerns appear reasonable and well documented. It is his hope that the Government of Manitoba and Repap will work together to produce forest harvesting plans which will protect the environment for all Manitobans.

Mr. Kennedy was, however, disturbed over the lack of water quality data available for the Saskatchewan River, given the number of pollution sources located upstream of The Pas. He feels that, over time, the quality of water in the River has deteriorated considerably.

Mr. Jack P. Johnson made a presentation to the Commission as a businessman, citizen of The Pas and a long time Northerner.

Mr. Johnson is not for development at any cost, however, he believes all development has environmental costs. He believes it is the government's job to ensure that Repap maintains and hopefully surpasses all environmental regulations in the treatment of the effluent from the plant on the Saskatchewan River, as well as ensuring that the wood resources used by the mill are not depleted.

Dr. A. Sandy Banks, made a presentation to the Commission as a private citizen of The Pas. Dr. Banks has been a physician in The Pas for 20 years and said he has observed the economic base of the town contract until it has become totally dependent on Manfor.

Dr. Banks believes the economic viability of the town will be contingent upon upgrading the existing mill. Concerns he had with regard to air pollution, water pollution, disposal of solid waste and management of the forest as a renewable resource were eased when he was given the opportunity to discuss them with the senior management of Repap. Dr. Banks believes that Repap will impart significant socio-economic benefits to the local area and province which will far outweigh any environmental loss.

Native Groups

Chief Oscar Lathlin of The Pas Indian Band emphasized that his people are still adjusting to the non-aboriginal way of doing things. It is now necessary for aboriginal people to live in a wage economy and therefore, they need jobs and development to survive. Currently, about 60 to 80 aboriginal people work at the plant, of which 45 to 50 are Band members.

Chief Lathlin commented that historically, non-aboriginals have caused the land almost as much pain and suffering as that brought to his people. He referred to other developments in the North that have damaged the environment and have permanently interrupted the Native communities located there. Despite good intentions and in spite of clearly knowing what will happen, no one has done anything to stop the disruption and destruction of the North. He believes this is because the people, agencies and governments responsible for policing the situation do not have to suffer the consequences of their failures.

A realistic appraisal of the facts suggests two things: one, that a Phase I permit to Repap would allow it to implement effective measures to clean up a bad situation, while providing desperately needed economic opportunities to their people; and second, the track record of industry, government and non-aboriginal people, in general, suggests that none of them are fit to manage or administer a program of environmental protection.

Based on discussions with the management of Repap, they have found this Company to be a more responsible and concerned corporate citizen than the previous owners. They believe Repap offers the best hope of cleaning up the ugly environmental mess that is the legacy of both CFI and Manfor.

The Pas Indian Band is prepared to give support to the Phase I proposal if the Company will stringently comply with all the environmental standards and regulations. To ensure this, the aboriginal people must be

NATIVE GROUPS (Cont.)

given a place in the management, monitoring and policing of regulations and restrictions surrounding the Repap development. Chief Lathlin said that they want meaningful participation and nothing less.

In order to better monitor the project, Chief Lathlin suggested that a consultation process or monitoring committee be put in place. If a committee was established for such a purpose, members should include not only public servants, but people who actually live in the area and who would experience the consequences if the Company did not abide by the licensing agreement.

Chief Jim Tobacco represented the Moose Lake Indian Band in his presentation. Chief Tobacco said that since 1962, and the flooding of northern lands and lakes for Manitoba Hydro developments, there have been few opportunities left in which to follow a traditional way of life in hunting, fishing and trapping. As a result, they must look more towards modern industry for money and a livelihood.

Economic development, however, should not desecrate the land. Development should proceed with an environmental awareness that living things must be sustained and nourished. They also want northern development that brings economic benefits to northerners, not only to southerners. With respect to Repap, they believe Repap's proposed changes have the potential to greatly improve the life of their people and that the risks are manageable.

The main concern expressed by Chief Tobacco with respect to Repap's Phase I conversions was for possible impacts on downstream fisheries from bleaching chemicals. In order to hold Repap to its commitments to protect the environment by using state-of-the-art technology, it was proposed that an independent environmental monitoring committee be set up with representatives from The Pas, The Pas Indian Band, Repap, the Local Government District and The Moose Lake Indian Band. This committee should be funded by the Manitoba government and Repap. Its functions would include: hearing complaints,

NATIVE GROUPS (Cont.)

recommending compensation, and directing environmental monitoring programs to ensure standards are met.

Mr. Michael Anderson represented the Manitoba Keewatinowi Okimakanak Inc. (MKO) in his presentation to the Commission. MKO represents approximately 27,000 treaty Manitobans who are members of the 25 Northern most Indian Bands. MKO's underlying purpose is to develop an overall integrated resource plan for sustainable long-term economic development. It is the purpose of this plan to create a stable and diversified economic base for Indian people without reducing the quality of the social, cultural and physical environment. MKO seeks direct involvement and a role in the management of the natural resources on which both the Northern economy and treaty rights are based.

MKO supports the position of conditional support of Repap's proposed Phase I facility taken by other Native and resource groups who made presentations to the Commission. However, Mr. Anderson stated that little scientific specialist expertise, except that provided by the study team, was presented to the Commission.

MKO was concerned that the findings of the MacLaren study team, which indicated there will be no significant impacts to fish, may be somewhat premature. This concern was based on: unknowns that were acknowledged by the study team about the actual production of chlorinated organics by the proposed mill; the significant variability in the efficiency of the aerated lagoon; the unknown nature of the transport of sediments bearing chlorinated organics; and, measurable reductions in fish biomass and reproductive capabilities at high dilutions of bleached Kraft mill effluents that have been reported in Sweden. Mr. Anderson pointed out that there have not been any documented overall fish population dynamic studies for the Saskatchewan basin in Manitoba. MKO asked the government to commit itself to monitoring program along with the Company and a community monitoring committee. Mr. Anderson stated that effective monitoring likely depends on developing adequate baseline data, prior to the commencement of bleaching operations.

NATIVE GROUPS (Cont.)

Mass balance information indicating the amount of the total chlorine consumed each day and the amount that is channelled into each of the mill's effluent streams should be applied to the monitoring program. Total system loadings in the Saskatchewan River should be estimated in terms of mass balance information, and deposition and degradation trends and mechanisms in the Saskatchewan River should be monitored.

MKO recommended that specific findings of the study team should be attached to the mill licence as enforceable regulations and combined in a monitoring and research program with the requirement to alter pulpmill processes should impacts be identified. The recommended regulations are:

1. No detectable discharges of dioxins and furans in the effluent leaving the aerated lagoon;

2. No impacts to fish arising from chlorinated organic discharges, other than the slight tainting that has been predicted; and,

3. No detectable impacts to human health.

Concerns were also raised with respect to optimizing the employment opportunities to local workers and area residents. It was recommended that some provision should be made for the training of construction workers to improve pay levels and participation at the mill site. Special preference should also be given to local suppliers regarding the review of bids and contracts.

Given the existing barriers to Native business to compete with established companies in the South (e.g. development of necessary physical and financial resources, and access to advice when bidding on contracts), MKO suggests conditions be attached to a licence that may be issued to Repap. These conditions would seek to maximize economic benefits to all Native communities and other entry-level contractors in the Preference area. Specifically, MKO suggests the following: contract packages that optimize

NATIVE GROUPS (Cont.)

opportunities for smaller, entry-level contractors; adequate pre-notification of contract opportunities for local and small contractors to enable them to assemble the necessary resources; a contracts liaison officer to act as a contact for potential entrepreneurs and contractors in the local and cutting areas; a review of contracts from Repap with local and Native business representatives to determine their opportunities; and, effective monitoring and program evaluation regarding these economic goals.

MKO also suggests that a community monitoring committee be established as a condition within the licence. The first task of this committee would be to examine the environmental monitoring programs proposed by MacLaren Plansearch. With respect to the bio-physical and socio-economic environment monitoring plan, Band members and other resource users should be formally included in the program.

Mr. Jerry Henderson, Tribal Government Advisor for the Swampy Cree Tribal Council spoke on behalf of the Council. The Swampy Cree Tribal Council is an umbrella organization of six First Nations bands in Northwestern Manitoba, including Chemawawin, Grand Rapids, Indian Birch, Mathias Colomb, Shoal River and The Pas. The Council's mandate is to promote, protect and exercise the aboriginal rights recognized by the Treaties and by the Government of Canada. Its ultimate goal is the creation and development of Indian self-government, which in their view can only be accomplished if bands maintain jurisdiction over their lands and resources.

Mr. Henderson pointed out that Repap's development will have a profound impact on the life and livelihood of all member Bands because of the Company's plans to make use of forest resources of the land on which Band communities are located. While the Council is interested in participating in Repap's development, it wants to ensure that it does not adversely affect their economic base, undermine their pending land claims or prevent them from pursuing their traditional occupations and use of natural resources.

NATIVE GROUPS (Cont.)

The Council will fully support the Repap conversion and proposed cutting areas, provided that:

1. An appropriate set of compensatory measures is provided addressing the short and long term economic needs of the First Nations, which are to be affected by the conversion and cutting areas;

2. The resources falling under Repap's jurisdiction are co-managed on an equal basis by Repap, the First Nations, and others with an interest in the development of the forest industry;

3. Comprehensive environmental base line data is obtained prior to the implementation of the conversion;

4. A publicly accountable process for ongoing monitoring and enforcement of environmental standards is put in place;

5. The First Nations lands which have been selected under Treaty Land Entitlement will not be included in the area to which Repap will have cutting rights; and,

6. Prior to assigning cutting rights to Repap, agreement is reached with the First Nations which have outstanding land claims in their area to ensure that their interests are recognized and protected.

Mr. Henderson pointed out that special efforts are needed to allow Band members to take advantage of job and business opportunities at the mill and suggested the following:

- an integrated training and employment program for Native workers wishing to work in the mill;

NATIVE GROUPS (Cont.)

- an agreement between Repap and the unions involved to expand the preferential hiring to include both local and regional workers;

- a recruitment drive in the First Nations Communities;

- a review of Repap contracting plans and procedures to ensure small scale cutting operations are not excluded; and,

- business development and training assistance for Native-run business which might be engaged in contract work for Repap and other spin-off activities at the mill.

Mr. Henderson concluded by emphasizing that the Swampy Cree Tribal Council wants to participate in the Repap development and feels they have a strong contribution to make. However, their unique role and jurisdiction must be recognized and supported.

Mr. Hubert Sinclair, Vice President of the Manitoba Metis Federation in The Pas Region and Elsie La Jambe, Board Member of the same, made a presentation to the Commission on behalf of the organization. The Metis Federation represents 23 locals or communities comprised of approximately 20,000 people.

In general, the Federation supports the development of the Phase I conversion, however, there are concerns that need to be defined further. The Federation has the following recommendations:

1. an independent environmental assessment should take place immediately;

2. a permanent committee should be established to monitor the impact on the environment;

NATIVE GROUPS (Cont.)

3. Repap should follow through on their commitment to meet or beat government regulations on effluent discharges;

4. the Native Liaison person currently employed by Repap should submit monthly reports on the status of aboriginal hiring and the retention of such;

5. in the cut areas, employment at the entry and technical levels must be ensured;

6. Repap should put forth a corporate commitment to assist communities in developing sustainable economies; and

7. Repap should provide firm written plans on the economic opportunities for Manitoba Metis Federation constituents.

Mr. William Thomas, Councillor of the Chemawawin First Nations Band of Easterville, made a presentation to the Commission on behalf of Chemawawin First Nations and Easterville Fisherman's Association. The Fisherman's Association promotes the economic and social interests of the Chemawawin First Nation and represents 66 Band members.

Mr. Thomas identified serious concerns expressed by the Band that are related to the Easterville Fisherman's Association. These include possible long term health effects and tainting on the fish attracted to Repap's waste water discharge in winter and lack of financial guarantees provided by Repap to ensure the Band and Fisherman's Association are properly compensated for any losses suffered in a reduction of fish quality. It was recommended that Repap post a bond to be used in case compensation is necessary and in the event Repap becomes financially unable to compensate the Band at a later date.

The Band and Fisherman's Association believed that an independent environmental impact assessment is necessary to ensure the assessment is

NATIVE GROUPS (Cont.)

unbiased. In this respect, they requested funding to enable them to hire a consultant qualified to make a proper assessment. As a final point, Mr. Thomas said they want guarantees of the specific numbers of their Band members that will be employed by Repap.

Unions

Mr. Chris Monk, a representative of the Canadian Paperworkers Union, spoke on behalf of the 1,500 men and women employed in the forestry sector in the Province of Manitoba, including about 300 people in the Manfor paper mill. The Union welcomes the Repap expansion because it ensures viability of the present operation and will provide future jobs for local residents.

Mr. Monk pointed out that members of this Union have dual roles as workers in the industry and as citizens with health and environmental concerns. Union members share the conviction that protection programs should not be separated from comprehensive and effective forest management policies under the control of the government.

The Union urges the Manitoba Government to implement legislation and regulations to ensure that forest yields are in perpetuity and believes the government should hold Repap responsible for a reforestation program that will ensure a complete renewal of all the forest, as well as putting in place technically advanced equipment that will prevent pollution of the environment.

The Union is also very much in favour of an ongoing monitoring system that would ensure that Repap is held responsible to its commitments. It would be appropriate for the Union to participate in this type of monitoring system.

Ms. Claire Dansereau, Environmental Planner for IWA Canada, made a presentation to the Commission. IWA Canada is a national union, representing

UNIONS (Cont.)

approximately 450 people in The Pas area, 600 in the province and about 50,000 in Canada. These people are mainly woodworkers, loggers, sawmill workers and truck drivers, both Native and non-Native. Ms. Dansereau pointed out that members in The Pas area will be affected by the licensing, not only because they are workers in the industry, but because they are residents of communities in which environmental impacts will take place.

Ms. Dansereau believes that the conversion of the mill will bring the possibility of a greater impact on the environment through air emissions and effluent discharges and because the new product has a lack of recyclability. However, Ms. Dansereau pointed out that there still is a market for the product and we should not prevent industrial development that takes into account the environmental implications of its actions. The focus should be on bringing all of the old mills up to the proper standards of environmental protection. Reference was made to Sweden where they allow pulp and paper production: what they do not allow is the accompanying pollution. In this respect, there is a need to encourage intelligent, disciplined development and to discourage and penalize development which defies regulation or which attempts to use outdated technologies.

Ms. Dansereau pointed out that different people and organizations have come to advocate different meanings for sustainable development. The Bruntland Commission clearly spelled out two fundamental requirements for achieving sustainable development - a need to redistribute the world riches and a commitment to environmental protection within economic decisions. Ms. Dansereau said that environmental groups at the hearings have asked that the project be put on hold until it is decided what sustainable development means to Manitoba. They have done so, she said, without consideration to the fact that the majority of the local residents have requested that the licence be granted. Moreover, no one has discussed what happens to displaced workers when the decision regarding sustainable development is being made.

UNIONS (Cont.)

IWA Canada does not agree that there is a need to wait until the Province comes to grips with its own sustainable development principles before licensing is granted. IWA Canada agrees that our society is in transition now with respect to this concept, however, the Union does not agree that the workers should pay the price during the transition period. Given that sustainable development requires a certain level of economic activity, if the environment is protected IWA Canada gives its conditional support to the mill conversion and recommends that Phase I of the Repap application be approved. This approval is contingent on several recommendations:

1. that a partially locally-based independent monitoring committee be established. Conditions of this committee include the following;

   - it is chaired by the Manitoba Environmental Health Board, with local medical and Native representation as well as representation from the Department of Fisheries an Oceans, Union and other concerned citizens,

   - it should have legislated or statutory authority to shut down the mill if a dangerous situation arose,

   - all reports and minutes of the meetings should be made available to the general public,

   - members of the committee who are not members as part of their regular jobs should receive a per diem paid in part by the government and in part by Repap, and

   - monitoring should be performed routinely and regularly by a trained, two-person group comprised of one Native and one non-Native unionized worker.

UNIONS (Cont.)

2. Wherever possible, cutting in areas within land claims should be done in later years. Where cutting cannot be postponed, management of the area should be done with participation by the affected Native bands. Accounting procedures must include ways of ensuring compensation if land claims are successful.

3. Licensing requirements should include:

   - on-going monitoring to determine the level and accumulation of dioxins and furans in sediments, bottom organisms and fish in the area of the mill discharge, and

   - background data should be generated prior to the converted mill start-up.

4. The licence should be pursuant to guarantees for stringent enforcement of regulations by the relevant government departments.

5. Wood utilization standards should accompany the licence to ensure that logs of superior quality for the sawmill do not end up in the pulp mill.

6. Assurance is provided that the Company will maintain the sawmill component of the project.

7. Approval of Phase I should, in no way, ensure an easier process for Phase II.

Other miscellaneous recommendations included: a suggestion that yearly or bi-yearly reports be made by Repap to the Department of Environment regarding the Company's application of new technologies; concurrent training to ensure that personnel are constantly aware of the need to be vigilant in

UNIONS (Cont.)

their work; intervenor funding to residents and citizens' groups; and, settlement of the terms of references for the Phase II impact assessment.

Mr. Leo Desilets, President of the Manitoba Building and Construction Trades Council, made a presentation to the Commission. The Council is composed of 18 affiliated local unions, representing over 5,000 construction workers on various projects in Manitoba. These workers generally reside in Manitoba and are shareholders in ensuring that, as a population, we are able to - within reason and an accepted risk limit - maintain our environment in a clean state without irreversible damage for the citizens of Manitoba.

The Council, believes the modification and expansion of the mill is a justified development, one that would fall well within the sustainable development concept for the province. The Council gives support for the granting of a necessary licence for the modification and expansion of the Manfor complex.

Mr. Desilets pointed out that the Manfor complex, following its initial start-up problems, has been a major economic benefit to the region. Repap's proposed modification and expansion will move the mill into a more competitive position to meet international market demands and will protect the viability of the industry for Northern Manitoba for many years to come. In addition to construction jobs, Repap will provide long-term employment within the production process and through greater log harvesting operations.

Mr. Desilets concluded by saying that the Council believes the expansion and modifications of the Manfor complex should be allowed to proceed with appropriate monitoring of the new owners and their commitments.

Resource User Groups

Mr. J.P. Bodnar, presented a joint submission on behalf of the

RESOURCE USER GROUPS (Cont.)

commercial fishermen from several communities within the Saskatchewan River watershed, including Grand Rapids, Cross Lake, Cedar Lake and Moose Lake.

The resolution presented by Mr. Bodnar to the Commission identifies fishing as a vital element in the local economies of these communities, adding up to business in the millions of dollars annually and providing food and income to many local people. Mr. Bodnar said that the Saskatchewan River watershed has already been adversely affected by two events: the Western Three Province Water Agreement, which resulted in less water flowing in the River in proximity to the Town of The Pas and which affects the delta lakes where commercial fishing took place; and, the recently discovered ground and groundwater contamination by the Manfor operation adjacent to the River.

With regard to the future, concern was expressed that there may be possible long term effects on fish quality from Repap's effluent. The resolution of Mr. Bodnar's submission is to require Repap to install equipment for disposal of effluent from the bleaching process that will totally reduce potential harmful effects to land, air, water and fish. A responsible monitoring body must be established to monitor mill discharges and ensure compliance to regulations. This body must report regularly to all residents within the Saskatchewan River watershed with regards to critical levels of discharges in relation to safe discharge levels. Furthermore, it is submitted that a mitigation process be established prior to any expansion in which full compensation is granted for losses sustained should the mill expansion result in contamination of water and fish, making them unfit for domestic and commercial consumption.

Mr. Bodnar also read letters from Mr. Gilbert Monroe, from the community of Grand Rapids, David Lathlin, President of the Moose Lake Fishermen Association, Mr. Roland Lavallee, Vice-President of the Saskatchewan River Fishermen Association, Chief Alpheus Brass of the Chimawawin First Nation and Hubert Sinclair, Vice-President of the Manitoba Metis Confederation. In general, the letters expressed concerns regarding the effect of chemical discharges from the new mill on water quality.

RESOURCE USER GROUPS (Cont.)

Mr. David Lathlin, President of the Moose Lake Fishermen's Association, told the Commission that, in total, approximately 405 people depend entirely (either directly or indirectly) on the commercial fishing in his community and if the fish are affected, there would be nothing else to rely on for jobs. Past developments of Manitoba Hydro and Manfor have had adverse effects on the fishing and hunting in the area and he believes that Repap will totally ruin their livelihood eventually.

Mr. Roland Lavallee, Vice-President of the Saskatchewan River Fishermen's Association, said that the fish, the waterfowl, fur-bearing animals and the vegetation are all affected by effluent discharges from Manfor. It is his opinion that the waters of the Saskatchewan River are already polluted and that Repap's bleaching chemicals will contaminate the water further. Mr. Lavallee also feels that further studies and research should be done on the river to ensure the water is safe and fish are free from contaminants.

Mr. Clem Jones, Area Manager for Ducks Unlimited Canada, in The Pas, made a presentation to the Commission on behalf of his organization. Mr. Jones indicated that Ducks Unlimited has provided input to the Impact Assessment and has met with Repap officials at their invitation several times to discuss the development.

Ducks Unlimited has had an active program in habitat development in the Saskatchewan River Delta for the past 50 years and has invested over $25 million to improve some 750,000 acres of habitat for waterfowl and other wildlife. There are plans to spend at least another $6 million in the area over the next decade for projects that provide critical breeding and staging habitat for northern populations of waterfowl, and to provide a refuge for prairie waterfowl displaced by drought conditions. Several of this organization's marsh complexes are of considerable economic importance and provide income to those involved in the local tourism and commercial fur and fishing industries.

RESOURCE USER GROUPS (Cont.)

The primary concern expressed by Mr. Jones was in regards to the potential impacts that the Repap Phase I mill could have on downstream water quality in the Saskatchewan River. Water from the river is used in some of their projects and as wildlife habitat.

Ducks Unlimited has been assured by Repap that their operations will be state-of-the-art and meet or surpass all government environmental standards. Ducks Unlimited expects the government to establish monitoring procedures to ensure the environment is adequately protected. The monitoring process should involve people who have a vested interest in the environment and in the area, such as members of the community, including The Pas, The Pas Indian Band, the L.G.D. and the surrounding communities in the cutting area. In addition, Ducks Unlimited asks that roadway expansion and clear cutting/reforestration programs meet high environmental standards to ensure that impacts on wildlife habitat and water quality are minimized. In concluding, Mr. Jones stated that Ducks Unlimited is not against development, but they favour sustainable development.

Mr. Jones also had some comments as a resident of The Pas. He endorsed the review process Repap has to go through. Mr. Jones also supported Repap and its management team in their stated commitments to bring the Manfor facility into an environmentally safe and clean operation.

Mr. Rick Hay, Northern Zone Manager of the Freshwater Fish Marketing Corporation based in The Pas presented to the Commission. The Freshwater Fish Marketing Corporation represents commercial fishermen and the commercial fishing industry. The Corporation is the sole purchaser and seller of commercially-caught fish in the provinces of Manitoba, Saskatchewan, Alberta, portions of northwestern Ontario and portions of the Northwest Territories.

The Saskatchewan River represents five of the most potentially commercially viable fisheries out of the 152 lakes that produce and market fish on an annual basis through their operation in The Pas. Of the six

RESOURCE USER GROUPS (Cont.)

million pounds of fish handled by the Corporation in The Pas operation, 70% is handled during the spring and fall seasons, with the remaining 30% handled during the winter season.

The Saskatchewan River basin downstream from The Pas includes several individual commercial fisheries, namely, the Saskatchewan River, Moose Lake-Pickle Channel area, Moose Lake East Arm, Summerberry River and Cedar Lake. As a unit, these fisheries have the sustained annual capability of producing 2,286,000 pounds of commercially-caught fish, made up of export grade whitefish, pickerel, Northern pike, goldeye, sturgeon, tullibee, and perch. The combined value of these fisheries, in terms of value to fishermen plus agency operations, is $3.5 million in one full operating year.

Concerns of the Corporation are twofold: the possibility of the injection of chlorinated dioxins and furans and other organic chemical compounds into the basin, which may render all fish in the basin unfit for human consumption; and, the possibility of adding many more chemical compounds into the basin than previously were known under the Manfor operation.

Commercial fishermen have questioned Manfor's discharges into the basin for years and believe it has resulted in a steady decline in fish stock in this area, as well as contributing to an ever increasing algae problem to their nets. In the late 70's, the Saskatchewan River fishery produced its quota every year and this continued until the '82-'83 period. Since then, it has been declining annually to the point where fish production in the last year was 66,832 pounds in comparison to the available 200,000 pounds of quota. Mr. Hay attributed this drop in production to the drought situation, hydro developments and, possibly, the Manfor facility.

Mr. Hay posed several questions regarding possible detrimental effects of effluent discharges into the basin on fish populations and fish quality. He noted that the 136 commercial fisherman and their helpers in the area have no assurances that the fishing industry and Repap can co-exist in

RESOURCE USER GROUPS (Cont.)

terms of the quality and volumes of fish presently produced. As a consequence, the commercial fishing industry requests that a mitigation process be developed whereby all commercial fishermen within the basin be compensated in terms of job income replacement in the event the expansion and addition of a bleaching process results in a situation rendering fish unfit for human consumption.

Mr. Hay concluded his presentation by stating that the commerical fishing industry welcomes the upgrading and expansion of the mill, but they need assurances that the two industries can co-exist for years to come.

Mr. Glen Ridings represented the Clearwater Lake Cottage Owners Association in his presentation to the Commission.

Mr. Ridings presentation related to Repap's interest in purchasing one of the three tourist lodges located in the Clearwater Lake Provincial Park and, failing to do this, applying for 20 acres in the Park to develop a lodge of their own. The Association requests full involvement in any plans for increased commercial development in this Park. It suggests that Repap should consider other areas for development because of the Park's existing density of use and the pressure on its quality.

Environmental Groups

Professor Peter Miller represented Time to Respect Earth's Ecosystems (TREE) in his presentation to the Commission. TREE's aim is to promote the understanding of forest ecosystems and human impacts on them, thereby ensuring that when we use the forests, we do so with minimal negative impacts on natural ecosystems.

Professor Miller pointed out reasons why the Repap development deserves the most thorough environmental scrutiny:

ENVIRONMENTAL GROUPS (Cont.)

1. no other project in Manitoba's history has covered the same extent of territory as Repap's operations will encompass;

2. the pulp and paper industry in Canada, in particular, deserves close scrutiny because, historically, it has been a major degrader of the environment;

3. the forests are the lungs of the earth and sustain a wide variety of values that must be protected;

4. the implications of the principles of sustainable development for forest practice have not been worked out by the Government of Manitoba; and

5. because the Government of Manitoba is a co-signatory to the contract with Repap, it should be viewed as a co-proponent with Repap.

With respect to the last point, Professor Miller stated that it is a deficiency of the Environment Act that the Environmental Impact Assessment was prepared by the proponent. He believes the Assessment should be funded by the proponent, but prepared by an independent group.

TREE recognizes the importance of the Repap mill for the residents of northern Manitoba. However, TREE also finds that the current Environmental Impact Assessment process for the Phase I mill conversion is so seriously deficient that it believes that the Clean Environment Commission should recommend to the Minister of the Environment that licensing of the Phase I mill conversion be deferred until after a proper assessment has been performed. TREE's assertion that the environmental assessment is inadequate was put forth within the context and meaning of sustainable development. In particular, Professor Miller said there was:

ENVIRONMENTAL GROUPS (Cont.)

- no mention in regard to characterization and justification of the sustainability of the forestry practices;

- no indication of Repap's response to the garbage crisis, to which its products contribute so significantly;

- no analysis of possible impacts on remote and global environmental stress from greenhouse gases, acid rain, etc; and

- no analysis of specific food chains that are operating in the Saskatchewan River.

Professor Miller argued the logic of dividing the Environmental Impact Assessment for the pulp mill expansion into phases and assessing them sequentially. He believes strongly that the phases should be assessed concurrently.

Reference was also made to the broadened scope of Manitoba's recently proclaimed Environment Act, which has been designed to anticipate and prevent environmental damage by requiring that all actions, which may significantly affect the environment, be carefully scrutinized before construction or operation of a development. Based on the intent of the Act, Mr. Miller submitted that the Clean Environment Commission has an obligation to consider the forestry impacts before the Phase I modifications and expansion in order to be in compliance with the intent of the Act.

Professor Miller also argued against those who favour the Repap development for its economic benefits while presuming environmental improvement over the existing Manfor facility. He is skeptical that, based on the proposed Phase II mill increase of production capacity from 500 to 1700 tonnes, pulp emissions of the various substances will be below total emissions currently documented at the Manfor facility.

ENVIRONMENTAL GROUPS (Cont.)

Professor Miller believes that an independent citizens committee to monitor the operation is important, however, people who will not receive direct economic benefits should be members of this committee, in addition to those that will receive benefits. From an environmental viewpoint, Professor Miller points out that the geographic scope of the project's environmental threat is much broader than that of the Town of The Pas. Environmental monitoring is therefore not just a local issue and should include representation from Provincial environmental groups as well.

In concluding his presentation, Professor Miller expressed the need to use Repap as an example of one place where environment and economy have come together through the joint cooperation of a company, government and citizens, who are together committed to the ideals of environmental protection, ecological integrity and sustainable development. If this cannot be achieved, Professor Miller believes that polarization and conflict with environmentalists is inevitable.

Ms. Heather Henderson, a member of TREE, expressed her concern, as a southern Manitoban, about the size of the forest to be cut. Ms. Henderson believes that Repap is doing a wonderful job in The Pas and does not want anyone to lose what Repap is offering the town. However, she believes the future of the world depends on the future of the forests and Northern Manitoba forests are now more important than ever because of the destruction of the Amazon rain forests and elsewhere. It is everybody's responsibility to act in the very best interest for the future of our forests and of our children.

Dr. William Goddard, a representative of Crossroads Resource Group, spoke about the difficulties of achieving the sustainable development objectives officially endorsed by the Governments of Canada and Manitoba. His opinion was that current economic models are incomplete in that they do not seem to foster sustainable development. Projects approved now may be incompatible with future policies.

ENVIRONMENTAL GROUPS (Cont.)

Mr. Goddard suggested that a least-cost planning economic approach may provide one mechanism for developing a sustainable society. In this approach, the supply side of providing a product is reviewed in terms of its energy and environmental costs. This is weighed against the conservation side to determine if that much supply is required, or if there are other processes to provide that supply more efficiently. The goal is to minimize costs and improve the efficiency of the overall process. If an investment in efficiency is more economical than an investment in energy material supply, priority is given to the former.

Environmental impact assessment should address these considerations. The proponent of a project should show that the proposal is the best choice (least cost alternative) among the technologies that are practical today or in the near future. Mr. Goddard said that least-cost planning should be based on enhancing the environment and the quality of life of people, not on mitigating the negative effects of inappropriate technology. Engineered technological systems that support sustainable development should not be designed to mitigate environmental impacts but to be compatible with biological systems.

Mr. Goddard recognized the difficulty in applying a least-cost approach to the Repap Phase I proposal. Inefficiencies of the paper industry as a whole are externalized, including monetary, social and ecological costs, in order to remain competitive. Mr. Goddard cited Repap's position as an example: that if the Company was required to include the cost of recycling, it could not remain competitive. The global economic system means that these forces are beyond control of the Government of Manitoba and serves to reinforce maintenance of existing technologies.

Referring to the scope of assessment, Mr. Goddard pointed out that the siting of the mill has never been reviewed in terms of minimizing environmental impacts and maximizing socio-economic benefits nor has the location with respect to forest resources been questioned.

ENVIRONMENTAL GROUPS (Cont.)

Mr. Goddard recommended that the mill be cleaned up and operated as it is until the Forest Management Plan is licenced. He suggested that the type of process Repap is proposing needs to operate at near maximum capacity to be efficient. There would not be much flexibility in terms of forest resource requirements once the new mill becomes operational.

Dr. Diane Malley made a presentation on behalf of the Manitoba Environmental Council. She explained that the Council is a public advisory group, established under the Manitoba Environment Act and appointed by the Minister of Environment to provide advice and recommendations on environmental matters, promote environmental awareness, and provide assistance in the development and presentation of environmental education programs.

The Repap proposal, and the forest industry in general, were recognized as being of long term importance to the Manitoba economy. The importance of boreal forests in the global ecosystem was also stressed by the Manitoba Environmental Council.

The Manitoba boreal forest is one of the last large boreal forest stands of harvestable quality in the world. It is a global world-class resource. Its existence value, as a carbon sink in the global ecosystem, may be greater than all its other values. This role must be seriously considered when the forest management plan is debated, because carbon dioxide is a greenhouse gas, contributing to predicted global climate change. When forests are harvested they no longer act as a carbon sink but rather carbon dioxide is released.

Many paper products are over-refined for the use to which they are put. Dr. Malley noted that the Repap proposal involves the manufacture of a luxury product that the world could live without. The costs of producing this bleached pulp are forest depletion and environmental contamination from the bleaching process. It is essential that the full extent of these costs be specified and the proposal modified where applicable to minimize the environmental impact.

ENVIRONMENTAL GROUPS (Cont.)

Changes in paper market demands and the increased importance of the recycling of paper in the future will affect Repap's plans, and Dr. Malley asked how the mill would be able to adapt to these changes. It was noted that as major users of paper, governments play a major role in setting market demands.

The Environmental Impact Assessment conducted by the MacLaren study team was found by the Manitoba Environmental Council to be thorough and comprehensive within the terms of reference given. Many changes to the mill appear to have positive or neutral environmental impacts in comparison with the present operation. The major negative impacts are caused by the increased effluent rates and the bleach plant.

Introduction of chlorinated organics into the waste streams was considered by the Manitoba Environmental Council to be the most significant issue arising from the Phase I mill proposal. It was noted that the Environmental Impact Statement did not even contain a guess as to how much total dioxin would be released by the operation. Problems related to other pulp mills have been caused by cumulative total emissions to the ecosystem and not just by the concentrations released in the effluent. Dr. Malley stated that the low concentrations of chlorinated organics introduced and diluted in the Saskatchewan River may still be accumulated in the environment. There are no guarantees that the Repap mill will not result in unacceptable health concerns arising in the future.

The Manitoba Environmental Council was of the opinion that Repap should be asked to reach a 70% chlorine dioxide substitution level by a stipulated date if this will reduce the total amount of chlorinated organics released to the environment.

The Manitoba Environmental Council made the following recommendations to the Clean Environment Commission:

ENVIRONMENTAL GROUPS (Cont.)

1. Should a licence be granted at this time for the Phase I mill, it should be conditional upon the procurement of a licence for a comprehensive and sound Forest Management Plan, based upon principles of sustainable development and providing for ecological reserves before it is too late to do so.

2. Final licensing for operation should be conditional upon demonstration of compliance with the relevant regulations and licence terms and conditions.

3. Specific licensing terms and conditions with respect to effluent quality should be tied to the assimilative capacity of the receiving stream and not to plant production as is the case with some existing and/or contemplated regulations. In addition, licence terms and conditions should include mechanisms that facilitate amendments in response to new information.

4. A license should include terms and conditions related to a monitoring program. Specific monitoring should include fish-effluent toxicity testing and periodic analysis for dioxins and furans in effluent, river sediment and fish.

5. Licensing of the Phase I mill should be matched by a Department of Environment commitment of resources for compliance monitoring and enforcement activities.

6. A committee should be established specifically to evaluate monitoring programs and licensing compliance of the Repap operations. Such a committee need meet only 2 or 3 times a year and would provide recommendations to the Minister and/or the Department with respect to enforcement and/or licensing revisions.

ENVIRONMENTAL GROUPS (Cont.)

7. A recycling plan for the Repap mill should also be required, perhaps as part of the Forest Management Plan.

Mr. Nick Carter presented a brief prepared by the Conservation Strategy Association of Manitoba (CSAM). Considerations of a broad nature were intentionally addressed in this brief. The intent was to question the place of the total development within the yet-to-be established sustainable development strategy for the Province of Manitoba.

Apart from the economic advantages to Repap, Mr. Carter suggested that there were two characteristics attracting the Company to The Pas: there is a good supply of spruce for producing the long fibre pulp required for high-grade paper; and, the air and water receiving emissions from the mill are unpolluted compared with other mills.

The dirtiest part of the production of bleached Kraft pulp will be done in The Pas and the resultant superior pulp will be shipped out of Manitoba for paper production. Society may well want the excellent paper which Repap produces but the need is only for special purposes. This end product could be dispensed with if society is serious about ecological sustainability. Mr. Carter wondered if Repap recognized the possibility of demand, from an environmentally conscious public, changing dramatically.

CSAM deplored the apparent lack of interest in recycling exhibited by Repap. Manitoba needs leadership in the field from two directions: first, a producer showing clear interest in minimizing demands on the forest by using recycled paper; and second, a government that is prepared to lead others by specifying recycled paper in making purchases.

Given the likely effects of predicted climate change, CSAM believed the greatest value of the western boreal forest may simply be its existence as a carbon sink.

ENVIRONMENTAL GROUPS (Cont.)

The impacts of the bleaching process need a second examination, together with a forceful declaration by the Department of Environment that Repap will be required to remain within the effluent parameters or they will be severely punished.

Mr. Carter said his group found the agreement between Repap and Manitoba to be driven largely by conventional ideas of development. They assumed that conventional exploitive techniques will apply in the woods and recommended that there should be a much deeper review.

In conclusion, Mr. Carter stated:

1. that a licence should not be granted to Repap for the mill conversion until an ecologically sound sustainable development strategy is in place for Manitoba forests, which takes into account the best available information on the ecosystems to be impacted and their probable changes over time under predicted climatic alteration.

2. should a licence be granted at this time for the mill, it should be conditional upon the procurement of a comprehensive, sound Forest Management Plan which has had a thorough public airing and is based upon principles of sustainable development.

3. such a Forest Management Plan should be written in language which enables the ordinary member of the public to grasp the intent and see the implications without being lost in technical jargon.

4. a professional arms-length second opinion should be sought on the modelling and prediction of effluent streams from the converted mill.

ENVIRONMENTAL GROUPS (Cont.)

Mr. Mike Sutherland, a representative of Manitoba Environmentalists Inc. gave a presentation on behalf of his group.

Mr. Sutherland pointed out that the toxicity of dioxin is still being debated by the scientific community and that it is suspected there could be synergistic effects from exposures to dioxin with other chemicals.

Suspected human effects of exposure to dioxins mentioned by Mr. Sutherland are liver damage and the potential to suppress the immune system. Dioxin is present in the food chain and it is suspected that most North Americans have some dioxin in their bodies. Nursing mothers pass on this dioxin through breast milk to infants with the result that infants are subjected to greater concentrations of dioxin/Kg body weight than their mothers.

In the environment, dioxin is very hard to break down. Photolysis, or decomposition through exposure to sunlight is the major mechanism breaking dioxin down in the environment. Sediments at the bottom of rivers are not exposed to sunlight so that decomposition rates in sediments are relatively minor.

Dioxins also contaminate bleached pulp. This dioxin can then enter the food chain. Mr. Sutherland stated that it has been demonstrated that dioxins move from milk cartons into the milk they contain.

If dioxins accumulate in fish in the Saskatchewan River, then the level of contamination will become greater as the years go by. Contaminated fish cannot be detected simply by looking at them, and a lot of people depend on the downstream fishery.

The information heard at the hearings about dioxin was based on informed predictions. Mr. Sutherland noted that almost all science is open to interpretation. Ten different scientists will give you ten different opinions

ENVIRONMENTAL GROUPS (Cont.)

on the conclusions of the same article. Mr. Sutherland said he found the consultants hired by Repap to be well informed and ethical. He did not question the integrity of anyone on the study team but noted they focused on the finding from one study that no dioxin was detected in sediments 10 miles downstream from a pulp mill. Dr. Lockhart later referred to the same study and focused on the finding that fish had significant levels of dioxin, much above the acceptable limits. Mr. Sutherland found these different interpretations to be understandable but said they highlighted the need for a more impartial and more objective consultant process.

In return for the jobs and investment into the northern economy, Mr. Sutherland said we will receive pollution. Moreover, we are ceding sovereignty over a large forest, more forest than we give to our provincial parks. In return for the opportunity to produce a product that cannot be recycled from our forest, Mr. Sutherland believes Repap should contribute to establishing some type of recycling facility in Manitoba. Mr. Sutherland also wondered whether pulp would be sold to the Repap paper mill in Wisconsin at market value or at cost value?

In conclusion Mr. Sutherland emphasized that, in his opinion, the Phase I assessment should be tied into the forestry management practices before it is licensed.

Ms. Alexa Campbell, representing the Consumers Association of Canada, stated that the Association protested some of the decisions made regarding the sale of Manfor to Repap Enterprises Inc. Their primary concern is that mill modification will introduce the production of bleached pulp. They believe this is an undesireable change.

Ms. Campbell noted that there has been a growing demand for unbleached paper products. She observed that people want these products and will pay more for them. She said that consumers also want environmentally

ENVIRONMENTAL GROUPS (Cont.)

benign products, and the production of bleached pulp is not an environmentally benign procedure.

Bleaching facilities in The Pas will release toxins into the environment. The hazards presented by dioxins were of particular concern to Ms. Campbell. The risk presented by the current level of inconclusive knowledge about the hazards of dioxin was considered by Ms. Campbell to be great enough that the mill should not be converted, especially since there are alternatives. Recognizing that mill alterations would result in reductions of conventional contaminants, she wondered why the mill was being cleaned up just to add a different kind of waste into the environment.

Referring to a recently conducted poll reported in the January, 1989 issue of Equinox magazine, Ms. Campbell said that most consumers wanted ecologically sound forest management practices. She noted that Manitoba does not have a long term Forest Management Plan and stressed that one should be developed and used to assess Repap developments.

Recycleable paper is being collected in Manitoba but there is a glut of it because there are not enough markets. The Consumers Association had asked the government in 1988 to have recycling operations included in the upgrading of the Repap mill. It was noted that the increase in production could be a result of including recycled fibres instead of increased cutting.

While recovering and recycling of materials is recognized as a valid strategy by the Consumers Association, they tend to recommend that people use reusable materials. The difficulty with people using environmentally benign products is that these alternatives are not made easily available in the marketplace.

The Consumers Association of Canada urges the Manitoba Government to seize this opportunity to become leaders in the struggle to keep the earth liveable, and respond to the wishes of the people of Manitoba by taking the following action:

ENVIRONMENTAL GROUPS (Cont.)

1. Refuse to allow Repap a licence until a forestry management policy based on principles of environmentally sustainable development has been established by the government.

2. Refuse to allow Repap to convert any portion of the operation at The Pas to permit bleaching of pulp or any other process which will result in any contaminants being released into the environment through water, air or soil.

3. Require Repap to maintain the facility for the production of Kraft paper.

4. Encourage Repap to produce unbleached pulp and paper.

5. Refuse to allow Repap a licence until another independent environmental impact assessment has been conducted.

Ms. Campbell concluded her presentation by saying it was a basic principle of sound consumerism that you get three estimates and compare them before you buy anything.

Ms. Nadine Kampen represented the Recycling Council of Manitoba in her presentation to the Commission. Her presentation provided an assessment of the Environmental Impact Assessment conducted on Repap's intended operations in The Pas from a recycling perspective. This assessment identified the following aspects of Repap's proposed Phase I operation:

1. Repap's operation will increase the consumption of raw forest resources. At this time, it is not possible to tell if this yield will be sustainable.

ENVIRONMENTAL GROUPS (Cont.)

4. encourage Repap to use the licensing delay to devise recycling strategies;

5. advise the Manitoba Government to maintain continuous communication between the Government and the Company to inform the Company of Provincial environmental stipulations as quickly as possible; and

6. consider the possibility of licence cancellation or change in the Repap deal in order to satisfy the findings and recommendations of the Commission.

Mr. Al Maki spoke on behalf of the Manitoba Naturalists Society, an organization that represents more than 2,000 Manitobans.

The Manitoba Naturalists Society's position at this time is to applaud the intentions and efforts of Repap to clean up the Manfor complex. However, it does not believe that the Department of the Environment should allow the proposed Repap modification and expansion because the Environment Impact Assessment has not addressed the fact that as much as 19% of the land area of Northern Manitoba may be affected. Without detailed research to learn the nature of the forest ecology, it is not possible to determine the forestation policies that will be sustainable.

The Society believes that now is the time to formulate a sustainable environmental policy for the use of the forests and all natural resources to ensure both the economic well-being of Manitobans and adequate preservation of Manitoban's wilderness heritage. Once the policy is developed and research is undertaken, the necessary restrictions on Repap can be placed before the Company is granted de facto access to the forests.

ENVIRONMENTAL GROUPS (Cont.)

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ENVIRONMENTAL GROUPS (Cont.)

With respect to Repap's Phase I operation, the Society is concerned about the release and effect of dioxins and furans from the mill. The Society recommends that before the licence is granted to Repap, the Company should adopt technologies which do not release any dioxins, furans or other toxins into the environment. This could be accomplished either by not producing bleached pulp or by using alternate whitening processes.

Mr. Bill Zaretsky represented the Sierra Club of Manitoba in his presentation. The Sierra Club has been operating in the U.S. for over a hundred years. In Manitoba, the Club has a current membership of approximately 250 and has been recognized and established for a little over a year.

Mr. Zaretsky pointed out that the Club strongly objects to the fact that the hearings are only investigating the impact of the mill conversion and expansion and not the impact of the forestry operation. As a second point, Mr. Zaretsky said the Club feels that an inadequate base line study has been completed on terrestrial and aquatic flora and fauna. Objections were also made with respect to forceful actions of Repap's lawyers during the hearings and the way such actions may intimidate the public in making their views known.

Mrs. Doersam and Mrs. Zeiler made a joint presentation to the Commission that dealt exclusively with the hazards of dioxins.

Reference was made to several papers that have been published dealing with the discovery of dioxin contamination in a variety of bleached paper products and the subsequent discovery that dioxins are found ubiquitously in the environments of industrialized nations. Other papers cited addressed the efforts that have been taken to reduce or eliminate the production of dioxins in pulp and paper mills by either replacing chlorine bleaching processes with alternative technology or by increasing the demand for chlorine-free paper products.

ENVIRONMENTAL GROUPS (Cont.)

In concluding their presentation, Mrs. Doersam and Mrs. Zeiler expressed concern about the toxicity of dioxins and stressed the need to eliminate dioxins entirely from manufacturing processes.

Mr. Hugh Arklie and his family, who reside in Dugald, Manitoba made a presentation to the Commission. Mr. Arklie explained that the reason for the family presentation was because there have been no children represented at the hearings and it will be, ultimately, the children of the Province that will be affected by the signing of the licence for Repap.

Mr. Arklie's concerns are that the mill conversion contains no capital budgets for the installation of a recycling component; that forestry aspects were not considered; and that by-products of the bleaching process (e.g. dioxins, furans and other poisons) seem to be considered more acceptable in the Saskatchewan River water system than if they were packaged for treatment and disposal as hazardous wastes.

Mr. Arklie also protested the lack of funding provided by the government of Manitoba to the intervenors in this process.

Mr. Kenneth Emberley presented his brief to the Commission as a private citizen and as a member of three environmental organizations making other presentations at the hearings.

Mr. Emberley first addressed the concept of high "through-put" in our industrial society and said that much of this is because of manipulation of the public through advertising on shiny, glossy paper. He pointed out that the net social good of the glossy paper and advertising has not been examined in the philosophy of the social needs surrounding Repap's proposed mill. In addition, there has not been any analyses performed to determine the net condition of the forests involved, the people in The Pas, the workers and the Manitoba government after Repap has operated its facility for 30 years.

ENVIRONMENTAL GROUPS (Cont.)

It is Mr. Emberley's suggestion that the Environmental Impact Assessment should reach out for 30 years. At five year intervals, a legal opportunity should be provided to open the contract and examine the results of long-term studies regarding the health of the mill, the people, the land, the forest, the financial operation and its ability to provide long-term viability to the community. He believes that there should be a funded citizen's group established to examine, at regular intervals, the operation and new regulations. Public hearings at five-year intervals should be mandated to correct defects of the operation.

Mr. Emberley noted that Manitoba has taken no initiative or leadership in the area of newspaper recycling. He believes that recycling will be very important in the future. In this respect, he pointed out that there are no financial incentives available to companies to encourage them to use recycled material as their raw material. He suggested as an example, that a tax could be levied on the amount of newspaper produced by a mill and, if the paper mill recycled paper, it would receive a reduction of this tax proportionate to the percentage of recycled paper utilized in the total newsprint production.

Mr. Emberley asked the Commission to look at existing literature that suggests dioxins are not harmless and to look at the long-term effect this mill will have on the people of Manitoba. He questioned if the Company shouldn't store the poisonous contaminants it will be producing rather than spending millions of dollars studying the amounts it proposes to discharge into the river and the resultant affects. He advocated that zero discharge of dioxin should be mandated.

With regard to the current hearings, Mr. Emberley thought it would have been a good idea if some environmental organization from Wisconsin had been present, as well as people familiar with the Repap operation in New Brunswick.

ENVIRONMENTAL GROUPS (Cont.)

Mr. Brian Pannell, who acted as Legal Counsel for Time to Respect Earth's Ecosystems (TREE) during the hearings, presented a summation on behalf of TREE. Mr. Pannell said that TREE did not believe society should not use paper, but rather that the Repap project should have the fullest form of assessment so that the best possible decision about the appropriateness of the proposal can be made.

Environmental consequences of the Phase I mill proposal may be greater than the Company expects, or they may be less. Mr. Pannell suggested that there is some kind of threshold that the proponent must cross to satisfy everyone that the environment will be protected. There are absences of knowledge, places where predictions are hazy, or where there is not enough data to make reasonable predictions in the assessment presented to the Commission by the proponent. In the absence of this information, Mr. Pannell questioned if the proponent had crossed the threshold.

Environmental protection is a relatively new concern, and scientific knowledge about problems of waste and pollution and the institutions to deal with these problems are new and evolving. It was stressed by Mr. Pannell that the issues are shifting and changing but the trend is towards stricter environmental controls. He advised that the Commission is not restricted to past practice in providing the best possible advice for these particular circumstances.

TREE believes that forestry issues are fundamental to this licence application. If construction is permitted to start before forestry management is considered, Mr. Pannell said that two wrongs will result. First, the process will be harmed by allowing construction before major impacts are known. Second, a whole host of forestry issues will be ignored, especially since there has never been an environmental assessment of forestry practices in Manitoba.

ENVIRONMENTAL GROUPS (Cont.)

Another major issue identified by TREE was that of recycling. The group does not ask that recycling facilities be built into the Repap Phase I mill but does require that Repap consider recycling in some fashion. TREE was concerned that Repap stated that recycling is not their responsibility as a Company, it is a social responsibility. Mr. Pannell said the Company is part of society, and as such benefits considerably from the use of paper. It is reasonable to require them to address the paper recycling issue.

With regards to the Phase I mill itself, Mr. Pannell said there are unknowns arising from the bleaching process. There are a number of areas where there is not much information, or where the information is not very definitive. For example, there will be variability in the operation of the lagoons during winter, there is a possibility that fish will be attracted to the effluent mixing zone, there is no inventory of species living in the Saskatchewan River, and there is very little information about fish movements in the river.

There is also very little information about background levels of chemical contamination in the river. The persistence of chlorinated organics is of unknown duration and how these chemicals are transported on sediments and subsequently deposited remain unknown. It is known that chlorinated organics enter fish and other life forms through water, sediments and food.

It was submitted by Mr. Pannell that there are enough unknowns that the Company should not be permitted the opportunity to bleach Kraft pulp. Alternative technologies were not thoroughly investigated, in Mr. Pannell's opinion, such that it is not known if the proposed mill process is the best available process.

The absence of information about the possibility of dioxins and furans accumulating somewhere in the ecosystem after they are dispersed

ENVIRONMENTAL GROUPS (Cont.)

through dilution concerned Mr. Pannell. It was his suggestion that, in the absence of information, the Commission should be cautious. When it is unknown what will happen it should be assumed that harm will result.

There is not a tremendous amount of information available to set regulatory limits for chlorinated organics. Appropriate limits are set based on best guesses and recently these limits have been steeply reduced.

Mr. Pannell advised the Commission to be cautious over undertakings promised by the Company about the quality of effluents they will meet in the future. These promises may be made in good faith now, however, if it turns out that the standards cannot be economically achieved, then the consequences will be judged by the old jobs-versus-environment argument. The pressure to preserve jobs is considerable now but it will be greater in the future. Now is the best opportunity to make proper decisions. Mr. Pannell urged the Commission to base decisions on what is likely to occur in the future, and not on undertakings provided by the Commission.

Consequences of possible decisions the Commission might reach were evaluated by Mr. Pannell. If the Commission recommends that a licence be issued, then Mr. Pannell believes a bad precedent will be set because the impact on forestry is unknown. Chemical discharge issues will have been taken on faith. The objectives of the Company will be met and the Town will receive a small construction input for a short while.

On the other hand, if the Commission recommends that licensing not proceed until all issues have been fairly dealt with then a good precedent for environmental protection will have been set. The existing mill will continue to function much like it does now. It will remove many of the uncertainties, particularly the forest issue. The provision of construction jobs will be delayed but these will come in the future. This decision may conflict with

ENVIRONMENTAL GROUPS (Cont.)

Repap's schedule and with the government's expectations, but the Commission should not look to these conflicts as their guide.

Although Mr. Pannell did not want to provide justifications for licensing, he did speak about monitoring. He pointed out that monitoring of heavy industry is in a dismal state in Manitoba. There needs to be sufficient monitoring by the Department of Environment on a regular basis to ensure that the undertakings are being complied with. There also must be a significant enforcement policy. Mr. Pannell said that the public needs assurances that 20 years from now people won't discover that Repap has problems similar to the ones experienced by the Manfor plant.

Business Groups

Mr. Doug Fahlgren represented The Pas and District Chamber of Commerce in his presentation. Repap was complemented with regard to their Environmental Impact Assessment and their commitments to minimize the effects of pollution discharge on the environment.

Mr. Fahlgren referred to the positive economic impacts Repap's development will have in The Pas and surrounding communities. These include the creation of construction jobs and a stabilizing effect on the economy of The Pas and District.

The Pas District Chamber of Commerce supports Repap's application for an environmental licence to proceed with Phase I. However, the Chamber believes that a subcommittee of the Clean Environment Commission should be formed and empowered to meet regularly to evaluate monitoring programs and licensing compliance. The subcommittee must have northern representation, including The Town of The Pas, The Pas Indian Band and Band community

BUSINESS GROUPS (Cont.)

representatives from surrounding reserves. In addition, adequate funding for the review meetings must be provided through the Department of Environment or the Provincial Government and, possibly, from Repap as well.

Mr. David Newman represented the Manitoba Chamber of Commerce in his presentation to the Commission. The Manitoba Chamber of Commerce is an incorporated provincial business organization with a membership of 42 autonomous Chambers of Commerce, as well as many individual businesses and communities throughout the province. The organization is dedicated to strengthening the competitive enterprise system in the provincial economy.

Mr. Newman focussed exclusively on the business perspective of Repap's proposed conversion and did not comment on the environmental risks. A main concern expressed was the type of business climate currently existing in Manitoba. For The Pas and Northwestern Manitoba, the most obvious and available economic growth opportunity appears to be Repap. Repap will be giving preference to hiring local and Manitoba labour and is committed to using local and Manitoba goods and services, subject to competitive pricing, quality and delivery. There will also be direct and spin-off benefits of the project that will extend beyond the local area to the regional and provincial economies.

Mr. Newman also believes that approval of Repap's proposed development demonstrates to potential investors that Manitobans have a profound respect for the environment but, at the same time, are open to proposals for responsible economic development. The Chamber urges the Commission to grant a licence to Repap to proceed, with the conditions necessary to ensure protection of the environment. The licence should be granted without undue delay to avoid interupting the enthusiasm and momentum surrounding the project.

BUSINESS GROUPS (Cont.)

Mr. Dale Johnson, General Manager of the Norman Regional Development Corporation (R.D.C.) made a presentation to the Commission. The Norman R.D.C. was established in 1970 to promote, encourage, assist and foster the economic development of northern Manitoba. It represents every incorporated community north of the 53rd parallel in Manitoba and is funded primarily by the Department of Rural Development.

Based on Repap's plan for a viable renewable resource industry contained within the North, Mr. Johnson asked the Commission to support the Company's assessment of the Phase I development. It is the Corporation's opinion that the Environmental Impact Assessment was extensive in reviewing the facts associated with development and, with responsible monitoring, the Company should meet current environmental standards.

Mr. Johnson also commented on sustainable development and emission standards. With respect to the former, Mr. Johnson believes that the concept of sustainable development is outside the terms of reference of the Commission. The concept of sustainable development is, however, still useful in that it highlights the priority that all involved groups (i.e. private sector, government, local community) place on environmental policies.

With respect to emission standards, Mr. Johnson pointed out that we must continue to plan with an imperfect information base and we must keep in mind that limits are based upon the current state of scientific knowledge. What is accepted today might not be accepted tomorrow. Both the Commission and the public are in the difficult position of relying upon experts who often disagree in their analysis of the facts. Consequently, we must have some faith that the Province of Manitoba is acting in our best interest in setting monitoring standards, as well as in identifying optimal resource utilization.

Education Groups

Mr. Tony Lucier spoke on behalf of the Keewatin Community College, located in The Pas. Appropriately 2,400 students are enrolled annually at the College, which serves, primarily, Northern Manitoba (north of the 53rd parallel).

The College supports the proposed expansion and modernization of the Repap operation. Mr. Lucier referred to 1986 statistics indicating that Northern Manitoba has only 5% of the total income of the province and the highest unemployment rate at 9.6%. 30% of the people are employed in seasonal work, 46% of the people who file tax returns earn less than $5,000 per year and only 20% earn more than $20,000 per year. Unemployment rates on many reserves and communities approach 90% and problems bred by unemployment - such as alcoholism, family violence, high suicide rates and lower life expectances - are very real and visible in the North.

Mr. Lucier noted that the population of Northern Manitoba is young and getting younger. Most people can expect to be living below the poverty line. Work is often in low paying or seasonal jobs, with no future. Lack of development in the North will keep Northerners under present atrocious socio-economic conditions.

The College believes the Repap facilities will provide opportunities for the social and economic development of Northern Manitoba. Repap has stated that over 400 permanent jobs would be created upon completion of Phase I and II, in addition to approximately 1,400 construction jobs. Also, Repap has stated that $36 million in materials and services will be purchased from local communities. In terms of training, Repap has indicated $5 million will be set aside to provide training and upgrading of skills for employees during Phase I and an additional $15 million during later phases. As well, a $1 million educational fund has been earmarked from Phase I training funds to train youth in The Pas for professional and technical positions in Repap.

EDUCATION GROUPS (Cont.)

Presently, the College has had about three meetings with Repap to discuss possible training packages that the Company may want and the College can offer.

Ms. Brenda Leslie represented the Manitoba Association of School Trustees in her presentation to the Commission. Central to Ms. Leslie's presentation were two resolutions recently passed by the Manitoba Association of School Trustees at the 1989 Annual Convention of the Canadian School Trustee Association. These resolutions reflect the feeling held by this organization and its national counterpart that by encouraging environmentally safe practices in all areas we will contribute to a safer environment for ourselves and for our children.

The first resolution acknowledges the fact that the majority of paper manufacturers employ a bleaching process which results in traces of dioxin in their product and effluent that is harmful to the environment. As a consequence, the Canadian Association of School Trustees has resolved that they encourage Boards of Education to call for dioxin-free paper in paper products they purchase. It was also resolved that the Canadian School Trustee Association consult with the Canadian Pulp and Paper Association in order to accelerate the changes within the industry towards processes which are dioxin-free.

The second resolution acknowledges the significant portion of waste paper in landfill sites and the potential of this waste paper to be recycled in a commercially viable operation. The Canadian School Trustees Association encourages Boards of Education to purchase paper with significant recycled paper content, and to consult with the Canadian Pulp and Paper Association to develop and encourage the development of paper recycling plants.

EDUCATION GROUPS (Cont.)

Ms. Leslie concluded her presentation by indicating that the Association is pleased with Repap's commitment to responsible environmental practices and they support and encourage the implementation of this policy in all areas of their operation.

Political Representatives

Mayor Bruce Unfried, of the Town of The Pas made a presentation to the Commission on behalf of the Town. He commended MacLaren Plansearch for their work in ensuring that the community became more knowledgeable of Repap's proposed modernization plan and the impact on the environment.

Mayor Unfried believed that the proposed modernization plans offer an excellent opportunity to develop a combined strategy to deal with economic issues and environmental concerns. With respect to the community, Mayor Unfried believed that Repap will bring stability to the area and will offer a new opportunity by offering training programs for unemployed youth. However, he suggested that there is a need and a role for a local environmental group to monitor Repap's plan. This group would meet three times per year to review plans and ensure that some stringent guidelines are met.

Mayor Unfried also believed that the Commission should recommend to the government that some funds be set aside to assist groups in making presentations on major projects such as this one. This would ensure more people would become involved in assisting the Commission in making decisions.

Mayor Ted Bercier, representative of the Moose Lake Community Council, made his presentation on behalf of approximately 500 Metis and non-status Indians living in Moose Lake, and in support of Chief Jim Tobacco

POLITICAL REPRESENTATIVES (Cont.)

of the Moose Lake Indian Band. The Moose Lake Indian Band and the Moose Lake Community Council are separate and distinct entities, although the communities themselves are situated side-by-side to make up the general community of Moose Lake.

Mayor Bercier related the disasterous effect of Manitoba Hydro developments on their traditional economy and pointed out that there is an estimated 85% unemployment rate in their population. Approximately 5% of the employed people have permanent, year round employment and a further 10% have seasonal employment opportunities only. Although residents of Moose Lake have come to realize that they must accept a realistic and modern approach to employment opportunities in order to sustain their families, they will not do this at the cost of losing their home land.

Mayor Bercier said that they want to become participants in the revitalization of an economy that will stimulate their own. However, he emphasized that Repap must act in a responsible and cooperative manner to assist in the management of their natural resources. He concluded his presentation by endorsing Chief Tobacco's presentation.

Mr. John Angus, Member of the Manitoba Legislative Assembly (Liberal - St. Norbert) made a presentation to the Commission.

Mr. Angus is in favour of a multi-representative monitoring committee because the development and concerns for the environment are ever-changing and must be continually monitored. Mr. Angus' specific concern was with regard to the impact of additional regional transportation of dangerous goods along the railroad. He would like further investigation into this matter, for example, testing of the railway lines and also a suitable maintenance program to prevent any serious accident. Mr. Angus pointed out that an agreement has already been reached regarding the upgrading of roads but due consideration has not been given to the railway.

POLITICAL REPRESENTATIVES (Cont.)

Mr. Harold Taylor, MLA for Wolseley and the Liberal Environment Critic made a presentation to the Commission on behalf of the Liberal Caucus. Mr. Taylor dealt primarily in three areas of concern: management of water to be used at the facility; variables surrounding on-site chemical usage; and, pollution abatement and emergency contingency plans.

With regards to water management, Mr. Tayler addressed the following concerns: possible thermal changes in river water after effluents are discharged from the facility and increased algae production; oxygen levels in the river after discharge; and, water treatment systems.

Specific concerns related to on-site chemical usage include: identification of actual chemicals and quantities to be used; whether chemicals used will be produced in the province; means of transporting chemicals from out-of-province; containment of chemicals in transport; and, possible railroad improvements that may be necessary.

Mr. Taylor's concerns regarding pollution abatement and emergency contingency plans addressed: types of responses and procedures to follow in the event of a process shutdown; monitoring processes; methods for dioxin control and regulation; efficiency of lagoon liners; danger of landfill leachate; odour levels; removal of existing asbestos insulation; plans for clean-up of internal chemical spills; response plans in the event of accidental release of chlorine from rail cars or tanker trucks at the plant; and, availability of specifically designed training programs for hospital staff, ambulance crew, police and nearby airport emergency crews.

In conclusion, Mr. Taylor commented on the process of licensing the Repap conversion and expansion. The Liberal Caucus would have preferred an integrated process tying forest management to the industrial licence.

Northern Manitoba Delegation

Mayor Bruce Unfried, of the Town of The Pas, headed a presentation to the Commission, made on behalf of a coalition of several organizations from Northern Manitoba at the hearing in Winnipeg. Participating in the presentation were representatives of The Pas and District Chamber of Commerce, Moose Lake Indian Band, The Pas Indian Band, Keewatin Community College, International Woodworkers and the Canadian Paper Workers Union. Although each representative had already made an individual presentation to the Commission at The Pas, discussion amongst the groups had identified common observations and objectives, and the concensus reached between members of the delegation was the subject of this joint presentation.

Common observations that were made included: very few people are opposed to granting Repap a licence for the planned conversion; almost everyone suggested that conditions be attached to the granting of the licence; and many suggested the formation of an advisory committee to monitor the construction and operation of the Repap facility.

Common objectives identified by these organizations included: encouragement of sound and prudent use of the natural resources of the area in order to create jobs and other economic development opportunities; ensuring that Repap delivers on its commitments to protect the environment; and, ensuring that all people in and around The Pas and in Manitoba in general share in the benefits of economic development.

To advance these objectives, it was recommended that the Province of Manitoba establish an Economic and Environmental Committee. Recommendations for the Terms of Reference for this Committee include: representation from Native groups, communities, interest groups, business and private citizens; that there be no government representation; that it be constituted within one month of Repap being granted a licence and meet a minimum of once each quarter; that it have access to information filed with all levels of

government with respect to the environmental and social performance of the Repap facility; that it direct the environmental monitoring program on plant emissions, including the provision of advice on improving the environmental performance of the mill, mitigation, compensation and remedial work; and, that it report to the Minister of the Environment. Some technical expert advice would be necessary to interpret scientific data from the mill.

Government Review

Mr. Larry Strachan, Chief of Environmental Control Programs, representing the Manitoba Department of Environment presented to the Commission. The process by which the Environmental Impact Assessment took place was briefly explained.

- The Environment Act Proposal for the mill conversion was received on April 18, 1989.

- Guidelines for preparation of an Environmental Impact Assessment (E.I.A.) were prepared and forwarded to Repap on May 1, 1989.

- Subsequently, the Environmental Impact Assessment was received in two stages on May 23 and June 6, 1989.

The Proposal and E.I.A. were reviewed by a Provincial Technical Advisory Committee with representatives from the Departments of Environment, Natural Resources, Health and Municipal Planning. The public and the Manitoba District Office of Environment Canada also reviewed these materials.

Deficiencies in the E.I.A. were identified by the Technical Advisory Committee and subsequently addressed by Repap through their consultants in the following reports, entitled: Response to Government Evaluation, Environmental

GOVERNMENT REVIEW (Cont.)

Impact Mitigation and Environmental Monitoring Program. Notwithstanding these submissions, the Advisory Committee identified further deficiencies (see Exhibit #42) which were made known to Repap during the hearings in The Pas. Deficiencies within the area of licensing were subsequently addressed by the Consultants to Repap during the hearing to the satisfaction of the Department.

As a result of the review of the Repap Phase I licence proposal, the Technical Advisory Committee identified the following licensing considerations:

Wastewater

- final effluent quality for the conventional parameters - pH, temperature, biological oxygen demand (BOD), total suspended solids (TSS), Sodium, Sulphate, Nitrogen, Phosphorous as identified by the applicant reflect that obtainable for the technology to be employed and should be incorporated into the Licence.

- final effluent quality for non-conventional parameters of adsorbable organic halogens (AOX) and dioxins are acceptable, however a more appropriate limit for AOX based on the technology employed would be 1.5 Kg/ADMT; furans should also be included as a non-detectable limit.

- limits should also be established for dissolved oxygen and resins/fatty acids; appropriate levels for both would be 2 mg/L.

- the Manitoba Surface Water Quality Objectives for fisheries protection should be achieved in the Saskatchewan River.

- the instream multiport diffuser should be used to discharge effluent to the Saskatchewan River.

GOVERNMENT REVIEW (Cont.)

- daily monitoring of pH, BOD, TSS, DO.

- weekly monitoring of AOX, dioxins, furans, sodium, sulphate, nitrate, phosphorous.

- monthly monitoring of resin/fatty acids.

- monthly toxicity test using rainbow trout and a LC_{50} 96 hour static test using 100% effluent concentration.

- bimonthly testing for fish tainting in situ using caged rainbow trout in the mixing zone until trends established.

Air Emissions

- air emissions identified by the applicant for particulates, total reduced sulphur, sulphur dioxide, dioxins, furans, chlorine, chlorine dioxide are appropriate and should be incorporated into the licence.

- noise and odour should not be of major concern and therefore limits should not be required.

- as a minimum, annual stack monitoring for all parameters should be done.

- ambient air quality measurements for total reduced sulphur should be done.

GOVERNMENT REVIEW (Cont.)

Solid Wastes

- site construction and operation of the new landfill will be subject to MR 98/88R.

- only solid wastes should be disposed of in the new landfill.

Sewage Treatment

- this matter has been handled separately pursuant to a Directors Order under The Environment Act; Environment Act Licence No. 1278 was issued on July 12, 1989.

Water Withdrawal and Treatment

- withdrawal of water is subject to a Water Rights Licence.

- water treatment will have to be approved pursuant to The Public Health Act.

- the water intake should be screened to prevent entrainment of small fish.

- backwash water should undergo treatment prior to discharge to the Saskatchewan River.

Gasoline and Associated Products

- all materials must be handled and stored in compliance with MR 97/88R.

GOVERNMENT REVIEW (Cont.)

Dangerous Goods

- all materials must be handled, stored, and disposed of in accordance with The Dangerous Goods Handling and Transportation Act and applicable regulations.

Other Monitoring/Study Requirements

- a detailed assessment should be made on the magnitude and value of area fisheries, including domestic, commercial and sports.

- ongoing monitoring should be conducted to determine the level and accumulation of dioxins and furans in sediments, bottom organisms and fish in the area of the mill discharge; background data should be generated prior to the converted mill startup.

- a study should be undertaken to verify the model predictions of mixing zone area, pollutant levels and fish tainting in the Saskatchewan River following startup of the converted mill operation.

- annual monitoring of vegetation and soils for dioxin, furans should be conducted.

- monitoring and analysis of sludges prior to deposition in the landfill should occur.

Contingency Plans

- contingency plans for all dangerous goods spills, releases should be formulated, approved and be in place prior to plant startup.

GOVERNMENT REVIEW (Cont.)

- a contingency plan should be developed to avoid thermal shock loading to the Saskatchewan River in the event of plant malfunction/shutdown, during winter operations.

- a plan should be developed and approved for compensation to domestic and commercial fishermen should their livelihood be unduly affected due to fish tainting by effluent discharge to the Saskatchewan River.

Mr. Barry Briscoe from the Manitoba District Office of the Environmental Protection Service, Environment Canada, made a presentation to the Commission. Mr. Briscoe pointed out that by agreement, Environment Canada has been the regulatory agency for Manfor since 1971 with respect to liquid effluent discharges. These regulations are under the Fisheries Act with the primary intent to protect the fishery resource. Regulated substances include total suspended solids (TSS), biological oxygen demand (BOD) and toxicity. Toxicity is actually an index of toxicity that uses rainbow trout in various dilutions of the effluent over a fixed time. It is not designed to represent site-specific conditions, but rather, is a biological indicator.

Development of these regulations took into account that there were many existing mills in the country in 1971 using older technology, therefore, they applied only to new mills constructed after 1971. Older mills were to treat the limits as guidelines. The expectation of the Federal government was that mills built prior to 1971 would eventually modernize, upgrade and expand and subsequently come into compliance with these regulations.

In 1979, Manfor achieved a compliance schedule with the Federal government when their secondary treatment plant became operative. After 1979, there was a very noticeable improvement in the quality of the mill's effluent as the Company met the Federal regulation for TSS, BOD and toxicity. Recent exceptions to this have been occurrences when TSS was in excess of limits.

GOVERNMENT REVIEW (Cont.)

With regard to regulating the Company, it has been the approach of the Federal government to have the Company collect the necessary data and report it on a monthly basis. Toxicity results are requested on a quarterly basis. Once in the last two years the toxicity tests showed the effluent to be toxic. In addition to the Company-reported data, a Fisheries Act inspector has been inspecting the facility at least once a year for the last several years to collect samples and audit the Company's reported data.

In August, 1989, Environment Canada released a discussion paper dealing with a proposal to amend the Federal Pulp and Paper Effluent Regulations that address the conventional parameters of TSS, BOD and toxicity. Revision of regulations will occur after comments have been received from industry, government and the public. The new regulations are expected to be in place some time in 1990, and will include provisions to allow existing mills time to make needed changes.

Concurrent with the proposed changes to Fisheries Act regulations, Environment Canada and Health and Welfare Canada are developing regulations under the Canadian Environmental Protection Act to control persistent toxics, such as dioxins and furans. These regulations will be available for public review by the middle of 1990. Until the new regulations come into force, provinces will regulate these substances themselves.

A third item discussed by Mr. Briscoe was an assessment taking place under the Canadian Environment Protection Act to determine what substances, in addition to dioxins and furans, should be controlled in the effluents from mills using the bleaching process. On the basis of the results from this assessment, appropriate regulatory action will be initiated.

Mr. Briscoe pointed out that under the Canadian Environmental Protection Act, there are formal provisions that allow provinces to apply and enforce their own regulations if the provincial regulations are equal to or more stringent than the federal regulations.

DISCUSSION

Introduction

Manfor has been a very important source of employment and economic activity for the Town of The Pas and surrounding region, but its future was unsettled. Purchase of this mill by Repap, and the announcement that the new owners would continue to operate the pulp mill and upgrade the facility, provides an important new sense of economic stability and growth for many residents of northern Manitoba.

Operation of the mill in The Pas by Manfor was never licensed by the Government of Manitoba, and a number of aspects of its operation were environmentally less than desirable. Wastewater discharges to the Saskatchewan River were considerably improved when, in 1979, the secondary wastewater treatment facility was installed. Groundwater contamination problems from spills and unsuitable waste disposal practices are now being addressed. Odour resulting from emissions to the atmosphere of total reduced sulphur (TRS) will continue until Repap completes the proposed Phase I mill upgrade.

Phase I mill alterations proposed by Repap will nearly eliminate odour problems from TRS releases to the atmosphere, and will reduce the amount of particulates in emissions to the atmosphere. Wastewater emissions of conventional contaminants will be modestly improved. Major impacts of the Phase I mill will be associated with the introduction of chlorinated organics into wastewater arising from proposed bleaching operations of the Phase I facility.

Concerns about chlorinated organics, including chlorinated dioxins and furans, in bleached Kraft pulp mills have arisen only in recent years, although the problem is as old as the bleaching process itself. Because the concerns are so recent and the considerations are complex, there are many

INTRODUCTION (Cont.)

unknowns and uncertainties. A great deal of research is being done in this area, particularly in Sweden, but, the chemistry of the production of chlorinated organics, their fate and degradation in the environment, and their ecosystem impacts, are not yet fully understood. Implications for human health are unresolved and regulatory strategies are still under development. The pulp and paper industry is responding to these concerns, and improved technologies are emerging. The scientific community is also working to better understand the complexities of the issue.

Enough is known about some classes of compounds in the proposed Repap waste stream to justify careful attention to the predicted impact of the Phase I mill effluent.

Sustainable Development

Sustainable development embodies a set of widely recognized principles linking environmental and economic considerations in all decision making processes. Fundamental to this set of principles is the realization that all present and future generations on this planet must have sufficient resources available to sustain their existence in a healthy environment and within a healthy, growing economy. Although conceptually simple to grasp, the application of these principles has a variety of interpretations and sustainable development is proving to be a challenging concept to translate into action.

Many presentations at the Repap Phase I hearings incorporated well considered suggestions on how sustainable development might be accomplished with respect to the pulp and paper operation and forest resource at The Pas. These presentations demonstrated considerable knowledge about the concept of sustainable development by members of all sectors present at the hearing and substantial interest in developing strategies and policies to implement these broad principles.

SUSTAINABLE DEVELOPMENT (Cont.)

The concept of sustainable development predated the World Commission of Environment and Development (WCED - the "Brundtland Commission"); however, the 1987 report of the WCED, Our Common Future, prepared at the request of the United Nations, provides clarification about what sustainable development means and how it might be achieved. General principles, rights and responsibilities taken from the first section of Annex 1 of Our Common Future broadly apply to the Repap Phase I project, and have been included in this report in Appendix B. In that report, sustainable development is defined as:

> "development which ensures that the utilization of resources and the environment today does not damage prospects for their use by future generations".

Our Common Future is a key document that continues to inspire world-wide action towards the adoption of the principles of sustainable development in the formulation of policy decisions. In fact, Sustainable Development Strategies have been adopted in principle by the governments of both Canada and Manitoba.

Canada played a leadership role in developing the report of the WCED, and has continued to be active in implementing the principles of sustainable development. The Report of the [Canadian] National Task Force on Environment and Economy submitted to the Canadian Council of Resource and Environment Ministers - CCREM (now renamed the Canadian Council of Environment Ministers - CCEM) in September, 1987, contains recommendations designed to guide efforts to integrate environmental and economic decision making within the Canadian context.

The Government of Manitoba actively participated in developing this 1987 report to the CCEM, and has continued to play a leadership role in ensuring that progress is made in implementing the recommendations of that report and the principles enunciated in Our Common Future. The Manitoba

SUSTAINABLE DEVELOPMENT (Cont.)

Minister of the Environment co-chaired the CCEM National Task Force when the 1987 report was prepared.

One new initiative now being undertaken in Manitoba is the development of a Land and Water Strategy based on the following objectives:

1. to sustain and enhance resource productivity and improve the environmental quality of Manitoba.

2. to improve and diversify income and job opportunities.

Two sub-strategies under the Land and Water Strategy, for Water and for Soil, are under way and public review of a draft sub-strategy for Forestry is anticipated in the near future.

The Workshop on Water released by the Government of Manitoba in the fall of 1988 contains draft objectives and policies which, although they are not final, and have not yet been officially adopted, are useful in determining how water related aspects of the Repap proposal might be more specifically evaluated in terms of the principles of sustainable development. Applicable draft objectives and policies from the Workshop on Water are included in Appendix B.

Future development in Manitoba, including the Repap Phase I mill alterations, must embody the principles of sustainable development adopted by the Government of Manitoba.

The link between environment and economy is a conceptual key to the principles of sustainable development. Considerations from the points of view of both environment and economy were expressed at the Repap hearing. Everybody who spoke to sustainable development recognized this link and the importance of both environment and economy but there were important differences in the perceptions of the representatives of environmental interests and those from the business community.

SUSTAINABLE DEVELOPMENT (Cont.)

Many speakers agreed that the Repap Phase I mill conversion would provide important and significant economic benefits but they had concerns that the development would not fully embody the principles of sustainable development.

Some speakers questioned the necessity of the bleached Kraft pulp product. They argued that society's consumption of wood fibre is greater than necessary because products made from virgin fibre are most often used only once and then discarded. If wood fibre were to be recycled and reused before being discarded, the need for virgin fibre, i.e., the need to consume trees, might be considerably reduced.

It was also argued that bleached paper, with its accompanying risks caused by the chlorinated organic contaminants created by existing technology, is not fundamentally required to maintain our standard of living, particularly not at the present use level. The preference for bright, white paper is a convention, a choice driven by forces which do not recognize the importance of sustainable development or adverse environmental effects. Unbleached paper may be just as useful for many purposes, in fact, non-white paper is often used for many purposes, including as a prestige product.

Speakers for environmental interests expressed the opinion that it was vital that all aspects of the operation of the expanded mill be considered, including impacts arising from forest use policy, before a licence is issued, to ensure that the required harvest from the forest could be maintained over the long term in accordance with the principles of sustainable development.

Speakers from the business community disagreed to a considerable extent with speakers for environmental organizations, stating that the scope of environmental arguments was unnecessarily broad for purposes of the Phase I mill alteration licence considerations. The proposed operation and the

SUSTAINABLE DEVELOPMENT (Cont.)

economic benefits generated were considered to be sustainable. Further, the proposed mill conversion was said to be environmentally sensitive and sound compared to the current Kraft mill operation, and it was thought that Repap would use "state-of-the-art" technology such that the converted mill would be one of the cleanest bleached Kraft pulp mills in the world. Company commitments were expected to be backed up by strict monitoring and enforcement. Wastewater discharges would not inhibit other uses of the river resource. Speakers from the business community concluded that the Repap mill would be a good example of sustainable development.

This argument was in turn questioned by environmental advocates who said that the Repap proposal was conceptually "business as usual", even if the proposed operation were to be environmentally cleaner than the Manfor operation. Sustainable development, in their minds, required the development of new relationships with the natural system and new approaches to the way in which we extract our resources, and the use we make of natural resources must become environmentally more benign.

Within the concept of sustainable development, the Clean Environment Commission recognizes the importance and relevance of broader environmental considerations such as forestry management and recycling, and these are addressed later in this report.

Impacts from Emissions other than Chlorinated Organics

Contaminants will be present in wastewater and airborne emissions from Repap's proposed Phase I facility. Many of these contaminants are non-persistent and are present in conjunction with many industrial and agricultural developments; these are termed "conventional contaminants".

IMPACTS FROM EMISSIONS OTHER THAN CHLORINATED ORGANICS (Cont.)

Wastewater Emissions

With respect to water quality in the Saskatchewan River, comparative figures were given for average concentrations of conventional contaminants in the effluent from the Manfor facility to those predicted for the Repap Phase I conversion. Table 1 illustrates these comparative figures.

Table 1. Conventional Contaminants: Comparison of Present and Predicted Concentrations in Wastewater Effluent.

Parameter	1988 Reported Average Concentrations	"Worst Case" Predictions For Phase I effluent
TSS	115 mg/L	53 mg/L
BOD	76 mg/L	38-153 mg/L
Sodium		60 mg/L
Phosphorous		0.9 mg/L
Sulphate		243 mg/L
Nitrogen		4.3 mg/L
pH	8.5	6.5 - 9.5
Temperature		35^{o}C(max.)

The impact on river water quality from increases in some of the concentrations of these parameters is expected to be modest. The prediction is based upon the expected character of the process streams from the mill operation as well as that of the efficiency of the wastewater treatment system. The plant effluent then receives considerable dilution in the Saskatchewan River even at low flow regimes.

Manitoba has in place a program for "Surface Water Quality Objectives" whereby watersheds in the Province can be classified for a series

of beneficial uses such as drinking water and the protection of aquatic life. This process results in a series of values of water quality constituents which should not be exceeded to protect an identified use. Although the Saskatchewan River has not been classified according to this system, it is expected that any classification adopted would include the protection of a cold and cool water fishery. The addition of the conventional parameters from the mill wastewater effluent, as predicted by the expert team of consultants, should not impact this fishery. Any increase of suspended solids will add to the concentration of this specific parameter which already exceeds the criteria by virtue of the current state of the river, however, the increase of suspended solids is predicted to not be significant.

It was pointed out by the MacLaren study team that it is difficult to predict exactly the composition of the wastewater, particularly after treatment. This indicates a need for monitoring wastewater effluent to ensure that the predictions made for the Phase I facility are achieved and fisheries are protected. In addition, it was pointed out that, in the presence of a thermal load in the effluent plume, very small amounts of nitrogen and phosphorus have the capacity to stimulate various kinds of biological growth within the mixing zone.

Air Emissions

Potential air emissions from the bleached Kraft pulp operation include particulates, total reduced sulphur compounds (TRS), and sulphur dioxide. Measured emissions of particulates and TRS at the Manfor complex over the 1977 to 1988 time period were frequently in exceedence of Manitoba guidelines.

The guidelines referred to by the consultants and discussed in a later part of this section for ambient air criteria are those of the Manitoba Department of Environment (July 1985) for particulate matter, TRS and sulphur

IMPACTS FROM EMISSIONS OTHER THAN CHLORINATED ORGANICS (Cont.)

dioxide. Chlorine and chlorine dioxide (and chlorinated dioxin and furan) values are taken from a list of Ambient Air Quality Criteria, Standards, Interim Standards, Tentative Design Standards, Guidelines and Provisional Guidelines of the Ontario Ministry of the Environment.

With respect to particulates, there will be an approximate 50% reduction of the total amount emitted. This will be achieved by the addition of a new precipitator on the recovery furnace.

Overall TRS emissions will be reduced to a predicted 50% of air quality guidelines. The recommended limit of TRS emissions is 20 parts per million (ppm) while current TRS emissions are approximately 212 ppm. There will be a 97% reduction in total quantities of TRS emissions in the new facility through the upgrading of the lime kiln scrubber, elimination of gases coming off the evaporator and blow tank, and conversion of the present recovery boiler to a low odour boiler. Expected TRS emissions from the smelt dissolving tank will be close to the 0.016 ppm level.

Current sulphur dioxide air emissions are about 800 tonnes a year. Increased production will require additional fuel for increased steam production. Sulphur dioxide air emissions could increase by as much as 90%, or to 1,500 tonnes a year if Bunker C oil is used exclusively to meet increased fuel requirements. This emission level would still be within current emission guidelines set for Manfor. If hog fuel is used exclusively to meet increased fuel requirements, there would be a 50% reduction in current sulphur dioxide emissions. It has not been decided to what degree increased fuel requirements will be met by either fuel source. Based on the exclusive use of Bunker C oil to meet additional fuel requirements, sulphur dioxide emissions are predicted to be 10% of the guideline.

Under Phase I conditions, the highest predicted concentration of sulphur dioxide close to the mill will be reduced from a present level of 12 to 2.6 micrograms per cubic meter. In general, with respect to impacts on

vegetation from sulphur dioxide, emissions received at ground level are predicted to occur in concentrations that provide margins of safety for all species.

Chlorine emissions (Cl_2) are expected to be 1% of the guideline and chlorine dioxide is expected to be 10% of the guideline concentration. These predicted concentrations are less than those reported in the literature as causing harmful impacts. However, definitive species sensitivity was not available for every species, indicating a need for monitoring the effects of chlorine on vegetation, as well as vegetation as it pertains to wildlife habitat.

Chlorinated Organic Contaminants

Perhaps the greatest potential for significant impacts, and certainly the source of the most contentious emission from the proposed Phase I pulp mill, arises from the proposed installation of the chlorine bleach plant. Chlorinated organic compounds will be created by chlorine used in the proposed bleaching process. The precursors, the unchlorinated organics, have always been present in the effluent.

The debate about how governments and industry should deal with potential problems created by the release of chlorinated organics to the environment is complicated by the fact that the identity and nature of the toxic effects of this group of compounds, or its constituent chemicals, are at present the subject of intense research. It is generally agreed that some of the chlorinated organics can be damaging to life forms, but it is not yet well defined at what level of contamination toxicological effects begin to affect human health or the ecosystems into which they are being discharged. International recognition of the dangers is driving other jurisdictions (e.g., Ontario, Sweden, the U.S.A.) to develop technology and legislation to achieve reductions.

CHLORINATED ORGANIC CONTAMINANTS (Cont.)

AOXs (adsorbable organic halides) are a broad group of chlorinated organic chemicals created when organic chemical byproducts of the Kraft pulping process bond with chlorine atoms from the bleaching process. Included in the AOX group are chemicals known to be extremely toxic such as dioxins, furans and pentachlorophenol. Most of the chemicals in AOX are considerably less toxic. Environmental concerns about AOXs have only recently been identified, but are now the subject of considerable international attention.

Health and Welfare Canada has established a limit for the most toxic chlorinated dioxin, 2,3,7,8-TCDD, at 20 ppt in food for human consumption. This limit is the estimated no-effect level for human exposure, assuming a weekly dietary intake of one meal of 200 gms of fish. This is the only member of the AOX group for which specific limits have been established in Canada. Crab fisheries on the west coast of Canada have been closed because of dioxin contamination in bottom sediments in the vicinity of a number of bleached Kraft pulp mill wastewater outfalls.

All human residents of North America have been exposed to, and retain within their bodies, trace amounts of dioxin and furan contamination. There are many sources of chlorinated dioxins other than bleached Kraft pulp mills, and in fact, some of these sources are natural, such as forest fires.

Complicating the uncertainty of where to set human health limits is the fact that some chlorinated organics are accumulated in the body, and chronic toxicity is not simply a function of the concentration of any one dose, but rather is a function of the total amounts ingested over time. Limits established to protect city dwellers who may occasionally eat contaminated fish would not provide the same relative margin of safety for people who live on the land and may eat contaminated fish as often as twice a day.

Environmental fates of AOX released into the ecosystem are unknown. There is only a very preliminary scientific understanding for a few of the

CHLORINATED ORGANIC CONTAMINANTS (Cont.)

more toxic chemicals in terms of their persistence and degradation, what their sub-lethal effects are, and at what concentrations sub-lethal effects begin to occur. This is because the research community only recently began to seek answers to these questions. There has been extensive research on this subject in Sweden during the last decade or so. Heightened public and regulatory interest in recent years has stimulated much more effort internationally.

Relative proportions of the chemicals in the broad group of AOX discharged from a mill vary depending on the technology used, the pulpwood feedstock (the source of AOX precursors) and the particular mill. For these reasons, AOX toxicity varies even between similar mills. The majority of the compounds that make up AOX are not particularly toxic. Others present in small amounts, especially the chlorinated dioxins and furans, are extraordinarily toxic. The exact composition of AOX discharges from any existing bleached Kraft pulp mill remains unknown.

Specific toxicities of individual compounds in the AOX group vary over a wide range. Some compounds, e.g., the chlorinated dioxins and furans, resin acids, chloroguaiacols and chlorophenols represent high toxic threats to the environment. Others are more readily degraded, but still may in some cases be the source of undesirable effects such as off-flavours in fish (e.g., the phenolics, guaiacols and veratroles).

Each of the chlorinated organic compounds behaves differently in the ecosystem and has a different pharmacology, and it has been estimated that there are over seven thousand chemicals comprising the chlorinated organics produced by bleached Kraft pulp mills. Of these, about 300 have been isolated and identified, and only a few of the identified chemicals have been isolated and studied in the laboratory or under certain field conditions to determine their toxicological effects. Although many other compounds remain unknown, it appears that several of the most toxic compounds, and those of greatest concern in terms of environmental protection, have been identified. Other toxic compounds which have not been fully identified are also present and are the subject of continuing international research.

CHLORINATED ORGANIC CONTAMINANTS (Cont.)

When levels of chlorinated organics are detected in ecosystems, even at levels considered significant, they are not always detected because something biologically wrong is observed. Contamination is usually detected when someone looks specifically for chlorinated organics, and has samples analyzed for chemical content. The impacts to ecosystem health occurring at the 20 ppt 2,3,7,8-TCDD level of contamination are currently the subject of intense scientific scrutiny. Immuno-suppression, multifunction oxidase activity, bacterial kidney disease, reduced fish egg viability, and other subtle but potentially devastating threats to fish population health have been demonstrated at levels of less than 100 ppt in whole fish.

There are a great many unknowns about the Saskatchewan River environment related to chlorinated organics. Scientific research on the effects of chlorinated organics on fish and lower level species is currently receiving considerable attention worldwide. Bioconcentration factors (BCF) for the chemicals making up the chlorinated organics group are largely unknown, however, for 2,3,7,8-TCDD the best figure to date in many experts judgement is 39,000.* Rates of decomposition, or persistence of these compounds in the environment are still being studied, as are ecosystem transport mechanisms.

A number of the groups and individuals who made presentations at the hearing were of the opinion that no chlorinated organic compounds should be allowed to be released into the Saskatchewan River. The small, but unknown potential for serious impacts led these presenters to state that the risk presented by bleaching Kraft pulp was not worth taking.

New, alternative pulping technologies are being pursued, such as the "Alcell" process being developed by the Repap parent company, and the intended goal is to remove the need for chlorine bleaching to produce the desired bright white product. These alternative technologies were stated to be still

* Mehrle et al (Environmental Toxicology and Chemistry, Vol. 7, pp. 47-62, 1988.) reported estimated average BCFs for 2,3,7,8-TCDD in rainbow trout to be 39,000. The no observed effect concentration was lower than the lowest exposure concentration of 38 pg/L (38 ppq).

CHLORINATED ORGANIC CONTAMINANTS (Cont.)

in the development stage and not available for full-scale production. The future trend will be to get away from chlorine bleaching altogether but, at present, chlorine is still required in the bleaching process. Technological improvements available today to the Kraft process are engineered to reduce the total amount of chlorine required for bleaching and to remove AOX from effluent before it is discharged.

Repap has stated that it is proposing to build one of the world's cleanest bleached Kraft pulp mills, using state-of-the-art technology. Internationally, the pulp industry is striving to reduce emissions of chlorinated organics, and the Repap proposal benefits from, and incorporates, improvements identified by this research. These technological advances represent improvements to the basic Kraft pulping process which was originally developed in the last century.

Specific technologies that Repap is proposing to use have been successfully operated in other pulp mills, but the particular mix of technology that Repap would build into the Phase I proposal has not been used before. It is, therefore, difficult to predict exactly what the quality of final effluent will be. There was agreement among the MacLaren Plansearch team that the proposed Phase I mill would produce a final treated effluent with less than 2.5 Kg/ADt AOX. Mr. Richards (Repap Manitoba Inc.) stated that the final treated effluent quality from the Repap Phase I mill would be less than 1.5 Kg/ADt AOX. Mr. Strachan (Manitoba Environment Department) said that the 1.5 Kg/ADt AOX limit would be more appropriate.

Repap has committed to undetectable levels of chlorinated dioxins and furans discharged, as measured by established protocols, and these are the substances that are of greatest concern. The desire to reduce AOX as much as possible is driven by a recognition that this general class of compounds is undesirable.

CHLORINATED ORGANIC CONTAMINANTS (Cont.)

The MacLaren study team predicted concentrations of diluted effluent from the Phase I mill would be low enough that there would be no effect on aquatic organisms. Mr. Gordon Craig discussed no-effect levels, stating that his calculations led him to believe that there are no toxicological effects on aquatic organisms below certain levels of chlorinated organics. It was his contention that if the concentrations of contaminants in the river do not exceed the threshold levels for species in the river, there will be no effect, and that the predicted quantities of diluted effluent released by the Repap Phase I mill would be below these levels and should have no impact. If the assumptions used in his calculations are not accurate (and there is currently a great deal of research being carried out in this area) then Mr. Craig's conclusions would be subject to modification.

The study team predicted no detectable discharges of chlorinated dioxins and furans (as measured by established protocols) into the aquatic environment (Saskatchewan River). They concluded that there would be no impacts to fish arising from chlorinated organic discharges (other than a possible slight phenolic tainting) and there would be no detectable impacts on human health. The MacLaren study team also predicted that there would be no impacts to animals or vegetation in the terrestrial environment.

Impacts to the Downstream Fishery

Commercial, domestic and sport fisheries downstream of the existing pulp mill are the basic and important natural resources that could be most significantly and negatively affected by the proposed Phase I alterations. The greatest fishing effort is exerted in the fertile lakes of the Saskatchewan River delta, over 50 Kms downstream of the mill site. Although there have been problems in the past with this fishery, because of impacts from the Grand Rapids Hydroelectric Dam (such as mercury contamination) and because of overfishing, the fishery remains productive.

IMPACTS TO THE DOWNSTREAM FISHERY (Cont.)

A large proportion of local residents are involved in some way with the fisheries. Representation to the Commission by local fishermen groups at the hearing demonstrated that fishing is of great value to the local economy and to the many Native people in the area, in terms of traditional lifestyle and as a source of food.

The MacLaren study team predicted that fish attracted for a period of time to the 36 m^2 effluent mixing zone may accumulate phenolics which can produce compounds that can taint fish, impairing its taste. It was acknowledged that fish will be attracted to the effluent plume during winter, thus increasing the likelihood of the occurrence of tainting. Flavour tainting chemicals are excreted by fish within a few days, and are not known to cause the fish any health problems. Tainted fish will only be a problem to the fishery if they are captured before the chemicals are excreted. A tainted fish cannot be recognized until it is eaten.

Even within the mixing zone, chlorinated dioxins and furans were predicted to be present only in such low concentrations that excretion rates would surpass rates of uptake, and fish would not accumulate these chlorinated organics.

Some minimal movement of fish along the Saskatchewan River is known to occur. Migrations past the wastewater discharge site have not been reported, but it remains to be confirmed that they do not occur.

If the predictions made by the MacLaren study team hold, then there will be only very minor impacts to the fisheries. If, on the other hand, significant contamination of fish does occur, such as widespread tainting of fish by phenolics or bioaccumulation of chlorinated dioxins and furans, the marketability of all fish harvested from the area could be affected. Much of the commercial harvest is sold to export markets, and acceptable levels of contamination are determined by regulatory and market conditions in those jurisdictions. Acceptable limits for these contaminants for many export markets may become more stringent.

IMPACTS TO THE DOWNSTREAM FISHERY (Cont.)

The domestic fishery is also very vulnerable to chlorinated organic contamination. A safe limit to protect human health needs to be much lower for people who eat considerably more fish in their diets than the general population for whom the Federal limit of 20 ppt in fish was set. There are also significant cultural aspects to the traditional domestic fishery that are not replaceable by alternative foods.

Social and Economic Impacts

There was virtually no opposition to the proposed licensing of Repap's Phase I facility from the majority of groups presenting to the Commission (i.e., Native groups, local citizens, political representatives, business groups, resource users and educational groups) although these groups also expressed concern that the environment be adequately protected. Construction jobs were the major positive impact identified by these various groups. Many referred to a sense of stability that Repap was expected to provide to the local economy over time.

It is important to note that for many groups represented at the hearing, the experience in the North has been negative in terms of obtaining employment from developments. In many cases, modern development has had serious implications for traditional ways of living on the land.

Past experiences with Manitoba Hydro developments and Manfor have made Native people extremely cautious about any new developments and at the hearing they requested guarantees from Repap, before licences are signed, for compensation for loss of income and jobs should mill effluents have a negative effect on the quality of fish caught in the Saskatchewan River. Mr. Strachan recommended that a plan should be developed and approved for compensation to domestic and commercial fishermen should their livelihood be unduly affected due to fish tainting by effluent discharge to the Saskatchewan River.

SOCIAL AND ECONOMIC IMPACTS (Cont.)

While support for the Repap facility was expressed by these groups because of its perceived economic and social benefits, several groups emphasized the need for the Company to make special efforts to maximize short and long term employment and business opportunities and to monitor the facility's construction and operation phases. These efforts would ensure that the Company meets its commitments for emission levels, minimizes environmental impacts and maximizes positive social or economic impacts to the Native and non-Native people living in the area.

The MacLaren study identified social and economic impacts for both the construction and operation phases of the proposed Repap Phase I facility. The major impacts predicted to occur during the 17-month construction phase would affect the local economy, infrastructure and services, and community values.

During the construction period there will be impacts in the local economy related to employment and income, business and inflation. The project is estimated to create approximately 670 person-years of new employment over a 17 month period, with an average of 715 workers over the peak six months. During this time period, it is estimated that approximately 20% of the workforce would come from within the preference area, which would include people living within 40 km of The Pas and Native people within Repap's cutting area. Of these 20%, it is estimated that about 90% (or approximately 140) would be of Native ancestry.

Total labour income estimates for the project were $26.2 million of which $5.5 million would go to people within the preference area. Re-spending of this worker income in the local economy was estimated at approximately $2.3 million over the 17-month construction period. An estimated 145 short-term (i.e. 6 months) spin-off jobs could be created in the local business economy as workers make direct purchases and wages are re-spent.

SOCIAL AND ECONOMIC IMPACTS (Cont.)

Direct business expenditure estimates in the local economy represent approximately $5 to $7 million, or 2% of the project's total cost. These expenditures include purchases of goods such as concrete, aggregate, lumber, office supplies, fuel and other materials. Goods will be purchased locally, given equivalent price, quality and supply.

It is also estimated that a short-term demand for rental housing may cause short-term inflation of its cost. This may have an adverse impact on people living on fixed or low incomes, such as students at the Keewatin Community College.

It is predicted that there will be a short term population increase of approximately 10%. In total, it is estimated there will be approximately 810 in-migrants to the local area during the peak months of construction. Housing for 630 construction workers will be provided in Repap's construction camp. The remaining workers (75) and their family members (105) are expected to look for rental housing.

With this short-term population increase, it is anticipated that there will be an increased demand for local services, including education, health care, law enforcement and recreational facilities. With the exception of educational services, it is anticipated that additional, short-term staff or facilities may be required to meet the increased demand in other service areas.

There is ample land available should there be an increase in the demand for residential land to build rental or owner occupied units. It would be necessary to re-zone land for commercial uses should a demand for this type of building materialize.

Potential changes in the community identified through key person interviews include an increase in road traffic from construction workers and related activities, and an influx of people demographically different from

SOCIAL AND ECONOMIC IMPACTS (Cont.)

present residents. A concern was expressed that jobs and business may pass the Native community by. However, these interviews also indicated that Repap will bring a sense of increased community stability. Under these conditions, people may decide to invest their money into the community by buying homes rather than renting.

It was also pointed out in the hearings that, although Repap and the Manitoba government have reached an agreement regarding improvement of the road infrastructure system and maintenance of the roads to handle the expected increased road traffic, no consideration has been given to an agreement that would bring attention to the maintenance and capacity of the railway to carry increased quantities of dangerous goods to the Repap mill.

With respect to the operations phase of the proposed facility, it is expected that there will be an increase of about 10 to 30 new jobs. In terms of population, however, no change is anticipated. Based on the biophysical evidence given in the impact assessment, it is anticipated that there will be no change in resource harvesting capabilities in the local area, no change in land use and no health risk to humans. Odours from the facility will be reduced and there will be only a slight increase in traffic. However, it was pointed out by members of the study team and others present at the hearings that these predictions are only as good as the data that supports them and data gaps were identified in numerous cases.

The need for economic development in the North was expressed numerous times throughout the hearings by local citizens and Natives, business, and educational groups. It is evident from demographic statistics presented at the hearings that employment and income are much needed in the North.

The local preference clause established for hiring practices in the construction phase and Repap's commitment of allocating training funds for workers indicates that the Company has sensitivity towards the need to extend

SOCIAL AND ECONOMIC IMPACTS (Cont.)

employment benefits to local people. However, skepticism over the outcome of these intentions was expressed in several of the presentations made to the Commission, as well as the key person interviews conducted in the socio-economic assessment.

It was pointed out in presentations to the Commission that there is a strong desire for the Company to extend its preferences to Native and locally owned businesses beyond the construction phase in order to maximize their long-term economic opportunities. No provisions have been made to assist local and Native groups to maximize business opportunities and spin-off benefits during the Company's operations phase.

While Repap should not be considered the solution to the unemployment situation in the North, there are ways in which the Company could offer assistance to Northerners that would help them maximize their opportunities over the long term. It was suggested that Repap provide a liaison person who would provide information regarding Company supply contracts to local and Native business. This person could meet regularly with representatives of business groups to help them identify and realize opportunities.

In the short term, actual hiring of construction workers should be monitored to ensure the conditions of the Preference Clause are met. This would allay concerns that benefits of the facility will pass by Native and other local people.

For the long term, to ensure that there are no unanticipated adverse impacts on the social and economic structure of the community, some mechanism should be in place to monitor conditions. Many of the Native and resource user groups expressed strong concerns over the possible impact of mill discharges on water quality and the effect this may have on fish caught for commercial and domestic use.

Forestry Considerations

The Phase I proposal under consideration at the hearings covered only alterations to the existing pulp and paper mill operation. Prior to the commencement of the hearings, the Environment Minister advised the Commission by letter that Repap Manitoba Inc. had been requested to register a new forest management proposal by September 30, 1989. (This proposal was filed on September 28, 1989.)

Environmental groups almost unanimously recommended to the Clean Environment Commission that if a licence is granted at this time for a Phase I mill, it should be conditional upon the procurement of a licence for a comprehensive and sound forestry management plan, based upon principles of sustainable development.

At the hearings the Clean Environment Commission acknowledged the link between the mill alteration proposal and the management of the forest, and reserved the right to make recommendations related to forestry aspects. It is of basic importance that forest management, especially in the area licensed to Repap for cutting rights, be publicly aired because such a plan has never been publicly reviewed. Such reviews and licensing are now required under the Act. However, in view of the pre-determined scope of the hearings, presentations to the Commission on the subject of forestry were limited to those included in final summation presentations. Presentation of detailed evidence on the forestry management plan was not otherwise permitted, and ruled as being beyond the pre-determined and announced hearing scope.

The most significant forestry link is that the licensing of the construction of an expanded 500 ADt/day Phase I mill would imply *de facto* approval of a forestry management licence to allow the cutting of trees sufficient to provide that amount of pulp, a 25% increase over the existing mill capacity of 400 ADt/day. The Commission has determined and is satisfied that there is sufficient wood supply to provide for 500 ADt/day mill capacity

FORESTRY CONSIDERATIONS (Cont.)

within the already existing forest management licence and that this supply is, in fact, committed in the contract of sale of Manfor to Repap, although this is subject to licensing renewal under the Environment Act.

Foresters had developed the concept of sustainable yield as a basic forest management principle before sustainable development principles were conceived, and the two terms operate from different precepts. Past forestry management plans for the area were developed based on an optimum sustainable yield approach. When the forestry management plan is reviewed on the basis of the new principles of sustainable development, there may be changes resulting from the application of new sustainable development concepts. A forest is not simply trees to be harvested when mature, but is an ecological entity that requires consideration from a number of environmental, social and ecological points of reference.

The forest inventory within the existing Manfor (Repap) forest licence area is based on an optimum sustainable yield approach. Conducted by the Department of Natural Resources for the purposes of the existing forestry management plan, this inventory indicates that there is adequate wood available for the 500 ADt/day Phase I pulp mill. The currently licensed annual allowable cut based on this inventory is 2.4 million m^3 of pulpwood. Should the cut area be reduced if Phase II developments do not go ahead, (as set out in the terms of the contract of sale) then the remaining area after reduction (Area 1 under the current licence) still has 2.1 million m^3 of pulpwood available for an annual allowable cut. The 500 ADt/day capacity Phase I mill would require only 0.9 million m^3 of pulpwood feedstock.

A new inventory and forest management review based on the principles of sustainable development might exclude some areas presently considered suitable for cutting, thus reducing the volume of pulpwood stock available. In this regard the contract of sale requires replacement of any areas withdrawn from cutting.

FORESTRY CONSIDERATIONS (Cont.)

Based on this evidence, the Clean Environment Commission believes that pulpwood resources in the region will be sufficient to provide feedstock for a 500 ADt/day mill. Therefore, the Clean Environment Commission is of the opinion that the Phase I mill can be licensed without jeopardizing the upcoming forest management review and hearings. It would be logical and desirable to have the licence application process now underway completed, and a new forestry management plan licensed, at about the time Phase I mill construction is finished.

The upcoming Clean Environment Commission hearings into the licensing of the Phase I related forestry management plan will require a detailed evaluation of the forest resource in terms of the principles of sustainable development. Forestry activities have diverse and widespread impacts on forest ecosystems including a great potential to disrupt the availability of the forest resource for other purposes, e.g., the global biosphere's need of the forests for oxygen production and the consumption of carbon dioxide, the need to preserve species diversity and protect rare and endangered species in both the plant and animal kingdoms, the need for forests as wildland habitat for all plants and animals, the need for forests as the source and reservoir of our water resources, and the allocation of areas to be set aside as wildlife management areas, recreational areas, heritage preservation areas, etc.

The development of a Forestry Sub-strategy under the Government of Manitoba's Land and Water Strategy (part of the Sustainable Development Strategy) would be logical and highly desirable before the commencement of the forestry hearings. Environmental and economic interests need to have a common definition and understanding of the implications which sustainable development principles have for the forest regions in Manitoba.

Recycling

There was testimony at the hearings addressing the importance to society of paper recycling in the interest of conservation and sustainable development. A considerable volume of the waste generated by Manitobans today is discarded paper and paper products. Much of this paper could be recycled, taking the pressure off landfill sites for paper waste disposal, and taking pressure off the forests which are being harvested to produce pulp for the manufacture of paper and a multitude of other essential products. The desirability and importance placed by society in general, and by Manitobans in particular, on the recycling of paper is recognized by the Clean Environment Commission.

There are no facilities in Manitoba at present to de-ink and re-pulp waste paper. Relatively small amounts of paper are presently collected and shipped out of Manitoba to be recycled. There is a small amount of waste paper that is reused in Manitoba in products such as paper board or insulation. The infrastructure needed to recycle paper to a significant degree in Manitoba does not currently exist.

A recommendation to the Clean Environment Commission made by a number of groups was that conditional to licensing the Repap Phase I proposal, Repap be required to incorporate a paper recycling facility to actively recycle paper as part of its operation in The Pas.

The Clean Environment Commission believes that the recycling of paper is most feasible when the recycling plant is located close to the population centres that produce waste paper. Any recycling facility in Manitoba should be initially located in or near Winnipeg, and any successive facilities near Brandon and Thompson. This is not to imply that waste paper from The Pas should not also be recycled, but simply that it would not be economical to locate a provincial recycling facility remote from the major sources of waste paper supply.

RECYCLING (Cont.)

The paper industry is very diverse, in terms of products produced, and in terms of geographical locations of pulp manufacturers, paper producers, and product markets. The high quality bleached Kraft pulp that Repap intends to produce will be sold to paper mills across Canada, the United States and possibly farther afield. Bleached Kraft pulp is quite different from the recycled pulp made from waste paper. Under present conditions the cycle of paper products is not and cannot be restricted geographically to Manitoba. The industry, the products and markets, are international, a factor that does not prevent recycling in Manitoba but does complicate the issue when the Repap proposal is considered in this context.

It was the Repap position that it would be unfair to force them, as a condition of any licence granted, to become involved as paper recyclers in Manitoba especially in view of their location and the fact that their intended product is not suited to the inclusion of recycled wood fibres. The Clean Environment Commission agrees with this position but wishes to encourage Repap to consider possible business opportunities that may arise as society and the industry address this broad problem, and to support recycling development as a paper industry initiative.

It was clear at the hearings that Repap did not object to possible participation in the recycling industry in the future, but wanted to retain the right to respond to market conditions when they felt it was required. In the opinion of the Clean Environment Commission, the underlying solution to the paper recycling problem lies not in dictating to industry what products they can produce. The solution lies with consumers, with individuals and organizations demanding environmentally friendly products. Repap, and the industry, will need to respond to any challenges represented by changing demands for bleached paper, but they also have an obligation, as manufacturers of the base product, to have an interest in fostering reasonable and beneficial solutions.

RECYCLING (Cont.)

The Government of Manitoba can play an important leadership role in guiding individual efforts. Targets recently set to reduce landfilled waste volumes by 50% before the turn of the century are a valuable first step, and efforts by the Manitoba Recycling Action Committee to develop a provincial recycling plan to achieve this are commendable. Beyond these initiatives, the Clean Environment Commission is of the opinion that the provincial government should move to specify that paper products purchased by the government and Crown Corporations contain recycled fibre. This requirement would help create a local market for these products and to set an example for the private sector. Such a policy has been adopted by the federal government of the U.S.A..

CONCLUSIONS

Introduction

The Clean Environment Commission has given careful consideration to the evidence and argument presented during the course of the hearings. As a result of this deliberation, and based on the evidence it heard and received, the Commission has reached the conclusion that an environmental licence can be issued to allow construction and operation of the proposed Repap Phase I pulp mill, subject to the terms, limits and conditions recommended in this report.

There were several key factors influencing the Commission's ability to reach the foregoing conclusion:

1. The present operation at The Pas has not operated well either in an environmental or economic sense. While bleached pulp conversion will introduce some new and controversial constituents into the mill effluent, other contaminant emissions will be reduced and cleanup of the mill site is already under way.

2. The Repap Phase I mill operation will produce important economic stability for the Town of The Pas and region.

3. The bleaching process proposed to be implemented by Repap is "state-of-the-art" and will result in an effluent that is predicted not only to meet present effluent standards for the controversial chlorinated organics but also those more stringent standards which have been identified by the governments of Ontario and British Columbia and by Environment Canada as likely to be adopted in the near future for new limits which may be phased in over the next several years.

INTRODUCTION (Cont.)

4. While an adequate wood supply is an obvious necessity, and while the Commission recognizes and supports the requirement of a careful review of Repap's proposed forest management plan and forest operation practices, the Commission believes that Repap already has an adequate supply of wood for the enlarged Phase I mill operation by virtue of the existing forest management licence acquired from Manfor. Therefore, the Commission believes that it is reasonable that the proposed Phase I mill alteration be licensed prior to and independent of other forest management considerations.

5. The Commission believes that the level of emissions from the proposed Phase I conversion, predicted by Repap's consultants, should be acceptable and should not cause serious and irreparable harm to the environment; however, in this regard a monitoring regime and ecological studies must be imposed to ensure the regulation of emissions and provide an early warning on the detection of any possible trend of unacceptable alteration to the environment. Should any of the assumptions upon which the MacLaren Plansearch Inc. Environmental Impact Assessment was based be found in error, then the Assessment will also be in error.

Enforcement

The Clean Environment Commission considers the requirements for regulatory activity by the Manitoba Department of Environment with regards to operation of the Repap Phase I mill to be sufficiently important, complex and likely time consuming, that the Commission believes that an Environment Officer position should be staffed and located in the Town of The Pas with the responsibility for aquiring knowledge of, and monitoring the Repap operation.

Citizen Advisory Group

Throughout the hearing there were recommendations from various and diverse sources that a local committee be formed to function in a monitoring overview capacity and as a liaison with Repap. **The establishment of a Citizen Advisory Group is endorsed by the Clean Environment Commission.** Presentations made during the hearing demonstrated that there is considerable support for formation of such a group from the various interests in and around The Pas, and from Repap. The Commission believes that similar groups active in other jurisdictions, such as the Miramichi Advisory Committee associated with the Repap mill in New Brunswick, serve a valuable function in those areas.

Role of the Citizen Advisory Group

Concerns that government based monitoring and enforcement have been inadequate in the past appear to be a primary reason that a citizen advisory group is now being proposed. In the opinion of the Clean Environment Commission, such a group could function:

(a) to ensure that suitable ecosystem and socio-economic monitoring is conducted and results acted upon;
(b) to ensure that that Repap lives up to its commitments;
(c) to provide early warning about the occurrence of unanticipated impacts; and
(d) to facilitate liaison between local citizens, the Company and the government on both environmental and socio-economic issues.

The citizen advisory group should not actively conduct its own monitoring but should be provided with the results of monitoring conducted by Repap and/or government departments. Providing these analyses is more appropriately the responsibility of Repap and the Manitoba Department of Environment, and it would be unnecessary and extremely costly for a third

CITIZEN ADVISORY GROUP (Cont.)

organization to duplicate these efforts. Rather than conducting monitoring, the citizen advisory group should have an active role in reviewing all monitoring policy, and ensuring that the program is effectively carried out.

Actions of the citizen advisory group should in no way replace the mandated role of the Department of Environment to conduct or require monitoring and enforcement.

Membership

Participants in the citizen advisory group should be members of local established groups representative of the diverse interests in the area. **The Clean Environment Commission recommends that the group should be established as an Advisory Committee under Section 5 of the Manitoba Environment Act, with members appointed by the Minister of Environment. The Commission believes that this group would serve a useful function at the present time and should be established as quickly as possible. Stakeholder groups identified by the Commission should be asked to forward the names of a number of local members for the selection of appointees by the Minister to the citizen advisory group.**

Groups identified by the Commission are:

Town of The Pas
The Pas Indian Band
Swampy Cree Tribal Council
Northern Chiefs Council (MKO)
Manitoba Metis Federation
Freshwater Fish Marketing Corporation
Local Fishermens Associations
Local Trappers Associations
Repap Management (environmental staff person)
Canadian Paperworkers Union
Manitoba Department of Environment
Environment Canada
Local Doctor
Manitoba Environmental Council
Keewatin Community College

CITIZEN ADVISORY GROUP (Cont.)

Links With Other Organizations

As an Advisory Committee under the Manitoba Environment Act, the group would provide advice and assistance to the Minister. **An annual report to the Minister prepared by the group, outlining activities of the group and their recommendations, should be required.** Further reports could be provided and meetings with the Minister held as required.

The Commission believes that the Department of Environment representative should be the local Environment Officer assigned to monitor Repap activities in The Pas. This would provide a second direct link between the group and the provincial government. A representative from Environment Canada would provide a similar link with the federal government. **All monitoring information should be provided to the citizen advisory group as it becomes available.**

Links with Repap would be partially achieved by having a Repap staff person at the management level appointed to the citizen advisory group. Ideally this person should have a working knowledge of, and responsibility for, daily environmental matters at the plant. This person would provide liaison between Repap and the group, and allow an exchange of information about activities and future plans. **Repap should be required to provide the citizen advisory group with information including environmental monitoring data collected by the Company, and operational briefings about significant activities including plant breakdowns, spills or unusual discharges.** Additional to the exchange of information about environmental matters between the group and the Company, there would be an opportunity to consider other matters, such as local and native employment targets, workplace safety, and contingency planning.

CITIZEN ADVISORY GROUP (Cont.)

The local members appointed to the citizen advisory group will provide links with the community. Beyond this there is a need for the citizen advisory group as a whole to provide direct liaison with the community. This would be accomplished by establishing an office open to the public, and such activities as the holding of public information meetings, hosting speakers and possibly the publishing of a newsletter in cooperation with the Company.

The Clean Environment Commission believes it is important that representatives appointed to the group be local, but there was some opinion expressed at the hearings that limiting membership to local representation would not necessarily provide a broad environmental view. The appointment of the local representative of the Manitoba Environmental Council as a member of this group would provide input from a recognized and respected environmental organization and would also provide access to the broad field of environmental expertise possessed by members of the Council.

Staffing and Office

A Chairperson to the citizen advisory group should be elected by the group from amongst its members once they are appointed. A full time staff person located in The Pas will be needed to function as a technical advisor/administrative organizer. This person should be hired by the citizen advisory group, and should be independent of both the government and the Company.

Office space for the group, and administrative support was offered by the Town of The Pas, and the Clean Environment Commission considers this to be appropriate.

CITIZEN ADVISORY GROUP (Cont.)

Funding

Additional costs to be considered, beyond those covered by the Town of The Pas, include staffing and other administrative costs that may arise such as the need for communications. **Payment for living expenses, a per diem and/or honorarium and travel costs should be considered for members when they attend meetings. These costs should be shared by the government and Repap.**

Ecosystem Monitoring

Extensive and strict ecosystem monitoring is needed to confirm the predictions made by the MacLaren study team. The monitoring regime required must at the very minimum confirm that the downstream fishery is not being contaminated, that human health is protected and that the general environment is not sustaining significant and irreparable damage. The assertion by the MacLaren study team that there will be a steady state of equilibrium achieved at which deposition rates of chlorinated organics are balanced with degradation rates needs to be confirmed in the context of the Saskatchewan River ecosystem. Data collected will also assist Repap in determining the effectiveness of measures taken to reduce chlorinated organic emissions, and to fine-tune the mill operation process.

Numerous areas where monitoring will be required were identified by the MacLaren study team when the Environmental Impact Assessment was conducted. These monitoring requirements include areas where gaps in the available baseline data were encountered, and where monitoring is required to confirm predictions. The document Environmental Monitoring Program (Exhibit 5) contains recommendations made by MacLaren with regards to these monitoring requirements. There are also ongoing discussions between Repap representatives and appropriate government officials to develop a monitoring program for the proposed Phase I mill.

ECOSYSTEM MONITORING (Cont.)

Beyond the need to confirm predictions and prevent excess discharges, there is an opportunity for scientific study of the dispersal of chlorinated organic compounds, and their fate and degredation in the environment.

Ecosystem monitoring will provide a post-operation impact assessment. Before this can be conducted, however, there is a need to gather pre-operation baseline data beyond that presently available.

Pre-operation Baseline Data

Pre-operation baseline data can be collected by accessing and synthesizing existing unpublished data and by collecting new data before the altered mill becomes operational.

The altered mill will not become operational for at least 17 months after a licence is issued. This means there is still well over one year available to conduct field surveys and monitor population fluctuations and movements through one full cycle of seasons. Ideally, trends should be monitored over a number of years, however, long term data needed to determine ecosystem trends will have to be derived from previously collected data or proxy data.

Only published sources of data were used by the MacLaren study team in preparation of the Environmental Impact Assessment, but there is a considerable quantity of additional data that was collected in previous years, and which should be available in an unpublished form. Most of this data is likely held by the Manitoba Departments of Natural Resources and Environment. Other organizations, such as the federal Environmental Protection Service, Ducks Unlimited, and the Freshwater Fish Marketing Corporation, etc. may also have further data.

ECOSYSTEM MONITORING (Cont.)

Baseline data reporting needs must be determined by the Manitoba Department of Environment, who with the cooperation of the Company should ensure the studies are conducted and that a final report is prepared detailing the findings. The citizen advisory group should be consulted during the determination of baseline data needs, and should be provided with data as it becomes available. The final report should describe results of the one year field survey, and identify the content and location of existing primary data files and any other relevant prepared reports. Data reporting protocols and analytical methodologies must be standardized and tailored to post-operation impact assessment needs.

Included with the report should be:

(a) a summary of the biological inventory,
(b) a description of the physical environment,
(c) results of the chemical contamination survey,
(d) a description and valuation of past and present natural resource uses; and
(e) an evaluation of ecosystem trends.

The final pre-operation baseline data report should be required to be finished six months after completion of the one year field survey.

Post-operation Impact Assessment

There are two aspects to post-operation impact assessment:

(a) monitoring conducted to ensure that the environment and human health are adequately protected and that licence conditions are met, including;

ECOSYSTEM MONITORING (Cont.)

i) effects monitoring, and

ii) chemical contamination monitoring.

(b) monitoring to provide ongoing data for scientific evaluation of the environmental impact of the Phase I mill.

Expertise to address these types of scientific studies exists in Manitoba, within the provincial government, the federal government (especially the Freshwater Institute), and the three universities.

Coordination of the post-operation impact assessment should be a responsibility of the Department of Environment, who should identify what monitoring must be conducted, and by whom. The Director should be responsible for ensuring that an annual post-operation impact statement is completed and made available.

The citizen advisory group should be consulted at all stages of the ecosystem monitoring plan, and should be provided with all monitoring data and reports as they become available.

Contingency Planning

There is a need for Repap to develop a contingency plan to provide emergency response to situations such as accidental spills of hazardous materials or plant upsets that result in release of process chemcials. Repap recognized this need and informed the Commission that they were developing a contingency plan but stated that it would not be possibie to provide such a plan before the completion of the hearing.

A number of groups and individuals stressed the importance of contingency planning, pointing out that accidental spills and releases could not only pose serious risks to mill workers and local residents but also have

CONTINGENCY PLANNING (Cont.)

the potential to release significant amounts of contaminants into the environment.

Repap is developing the response programs, and conducting the multi-agency planning that is required to develop a contingency plan. The Clean Environment Commission believes that a contingency plan to provide emergency response should be completed as soon as possible, and before the Phase I mill starts operation, and that the plan should be acceptable to the Manitoba Department of Environment, local municipal officials in The Pas, and the citizen advisory group. The Company should conduct ongoing staff training to ensure the contingency plan can be effectively implemented under emergency conditions, should make available and maintain appropriate equipment, and should implement process controls to regulate accidental releases of contaminants to the extent practical.

Impact Mitigation

A number of concerns identified by the Clean Environment Commission - some of which are not addressed elsewhere in the report - are included in this section.

Halon Fire Extinguishers

It is indicated in the Environmental Impact Statement prepared by the MacLaren study team that Repap intends to install a fire extinguisher system charged with Halons. Although Halons may be the best available extinguishing agent for the intended use, the Commission believes it necessary to point out that Halons, along with chlorofluorocarbons, are known to contribute to the destruction of ozone in the stratosphere. Because Halons are a hazard to the ozone layer, they are coming under Provincial and Federal regulatory control, and the production and availability of these chemicals will likely be phased

IMPACT MITIGATION (Cont.)

out starting in the near future. For these reasons, the Clean Environment Commission urges Repap Manitoba Inc. to examine and consider installing alternative, environmentally benign fire extinguisher systems.

Equipment Maintenance and Staff Training

Effective and consistent operation of the Phase I proposed mill is critical to achieving the quality of effluent predicted to be discharged into the atmosphere and the Saskatchewan River.

The Clean Environment Commission considers it important that the Company should ensure that at all times the mill and related equipment and the wastewater and air collection and treatment systems which are installed or used to achieve compliance with the Environment licence are properly operated and maintained, that the staff involved in these processes are adequately trained and that training is continuously upgraded.

Chlorine Dioxide Substitution

At the hearings Repap indicated they would achieve 50% chlorine dioxide substitution rate shortly after starting up the Phase I mill, but were unable to provide a schedule as to when they might achieve the targeted 70% chlorine dioxide substitution rate. The Clean Environment Commission is not as concerned with the rate of substitution achieved as they are with the need to reduce the total amount of chlorinated organics, and specifically the need to reduce the more toxic components of this class of pollutants, particularly the chlorinated dioxins and furans, to the minimum level that can be practically achieved.

IMPACT MITIGATION (Cont.)

The Clean Environment Commission believes that within one year after operation of the Phase I mill commences the most effective and practical rate of chlorine dioxide substitution, at or near 70%, should be established and implemented.

Contaminated Solids Disposal

The Clean Environment Commission considers that hazardous wastes, such as chlorinated dioxin and furan contaminated solids, require special consideration.

The Clean Environment Commission believes that aerated lagoon sludges and other solid wastes, contaminated by levels of chlorinated dioxins and furans that are above a level to be specified by the Department of Environment, should be declared to be hazardous wastes.

All dangerous goods and hazardous wastes must be handled, stored and disposed of in accordance with the Dangerous Goods Handling and Transportation Act and applicable regulations.

The construction and operation of any solid waste disposal site will be subject to Regulation MR 98/88R under the Environment Act.

Release of Untreated Effluent

The MacLaren Environmental Impact Statement states that there may be periodic bypasses of untreated effluent to the river. Given that at high enough concentrations the toxic nature of chlorinated organics is a firmly established fact, the Clean Environment Commission considers such a practice to be unacceptable.

IMPACT MITIGATION (Cont.)

The Clean Environment Commission considers it to be very important that only treated effluent, to the quality specified, be discharged into the Saskatchewan River, and that Repap be required to undertake measures necessary to prevent unacceptable discharges.

RECOMMENDATIONS

The Clean Environment Commission recommends that the Manitoba Department of Environment develop and issue a licence that will address the current pulp and paper mill operation consisting of a 400 Air Dried tonne per day (ADt/d) unbleached Kraft Pulp & Paper Mill and secondly the Pulp Mill conversion to a 500 ADt/d bleached Kraft Mill, which would include the following clauses.

A. Current Operation

1. Water Pollution Control

(a) Wastewater effluent from the Company operation shall be regulated by the Department in accordance with conditions set forth in the compliance schedule promulgated by Environment Canada on November 1, 1979 under Federal Fisheries Act Regulation SOR/ 71-578 recognizing that the regulated contaminants under the Act being biological oxygen demand (BOD), total suspended solids (TSS) and toxicity should reflect the most recent effluent data base, i.e., 1988/89.

(b) A monitoring and reporting program similar to the program negotiated between Environment Canada and the Company shall be established by the Environment Department and upgraded as necessary.

2. Air Pollution Control

(a) The Company shall undertake to maintain Total Reduced Sulphur (TRS) levels in the ambient air near dwellings below the Maximum Acceptable Levels.

(b) Source and ambient monitoring of air emissions shall be continued and upgraded as considered necessary under direction from the Environment Department.

RECOMMENDATIONS (Cont.)

B. **Proposed Operation of the Phase I Converted Mill**

1. Water Pollution Control

(a) The discharge from the wastewater treatment facility shall be to a diffuser outfall located in the Saskatchewan River as described in testimony presented at the Clean Environment Commission hearings and as otherwise specified by the Department.

(b) Treated effluent shall be regulated in such a manner that the following wastewater contaminant levels are not exceeded;

BOD	10 kg/ ADt daily
TSS	5 kg/ ADt daily
AOX	1.5 kg/ ADt daily
Dioxin & Furans*	not detectable (at anytime)
Total Nitrogen	5.0 mg/L (at anytime)
Phosphorus	1.0 mg/L (at anytime)
pH	6.5 - 9.5 (at anytime)
Sulphate	250 mg/L (at anytime)
Sodium	60 mg/L (at anytime)
Resin Acids	2 mg/L (at anytime)
Toxicity**	LC 100 equal to 100%
Temperature	less than 35^{o}C

* Based upon the total quantity of chlorinated dioxins and furans expressed in terms of 2,3,7,8-TCDD toxic equivalents being less than the detection limit for 2,3,7,8-TCDD; the chemical analysis shall be conducted on a congener specific basis.

** At the end of the 96 hour toxicity test, exposed fish shall be subjected to EROD testing (method to be determined in consultation with Dr. L. Lockhart, Freshwater Institute) to determine test fish stress levels.

RECOMMENDATIONS (Cont.)

(c) All discharges to the Saskatchewan River from the plant site shall be free of visible solids, foam, or oil.

(d) Compliance with the wastewater contaminant list in Clause B.1.(b) shall be based on composite samples collected from the discharge of the aerated lagoons with the exception of toxicity which shall be based on a grab sample from the discharge of the aerated lagoon and pH and temperature which shall be based on a method of continuous measurement of the aerated lagoon discharge.

(e) Analysis of samples of wastewater shall be in accordance with methods prescribed by the Department from time to time following consultation with scientists at the Freshwater Institute.

(f) The discharge of cooling water and surface run-off from the plant site shall be directed to the Saskatchewan River and shall be monitored for chemical oxygen demand (COD), TSS, oil, grease, specific conductance and toxicity with a weekly frequency based on a grab sample apart from toxicity which shall be once per year at the time of spring snow melt and run-off.

(g) Wastewater contaminants from the aerated lagoon shall be monitored by the Company with the following frequency to demonstrate compliance of the wastewater:

Flow	continuous
BOD	daily
TSS	daily
DO	daily
AOX	3/week
Dioxin & Furan*	daily

* Chlorinated dioxins and furans to be monitored daily on a congener specific basis until the operation is stabilized, and then weekly.

RECOMMENDATIONS (Cont.)

Total Nitrogen & Phosphorus	weekly
pH	continuous
Sulphate, sodium	weekly
Resin acids	2/month
Toxicity	2/month
Fish Tainting	monthly
Temperature	continuous

(h) Only treated effluent, to the quality specified, shall be discharged into the Saskatchewan River, and Repap shall undertake measures necessary to prevent unacceptable discharges.

2. Air Pollution Control

(a) The Company shall operate the Recovery Boiler in such a manner that:

i) the concentration of particulate matter shall not exceed 0.23 grams per cubic meter (gms/m^3).

ii) the emission rate of sulphur dioxide shall not exceed 2.1 kg/ADt.

iii) the concentration of TRS shall not exceed 20 parts per million (ppm).

(b) The Company shall operate the Lime Kiln in such a manner that:

i) the emission rate of particulate matter shall not exceed 0.46 gms/m^3.

ii) the emission rate of sulphur dioxide shall not exceed 0.25 kg/ADt.

iii) the concentration of TRS shall not exceed 40 ppm.

RECOMMENDATIONS (Cont.)

(c) The Company shall operate the Power Boiler in such a manner that:

i) the emission rate of particulate matter shall not exceed 0.57 gms/m^3.

ii) the emission rate of sulphur dioxide shall not exceed 6.2 kg/ADt.

(d) The Company shall operate the Smelt Dissolving Tank in such a manner that:

i) the emission rate of particulate matter shall not exceed 0.12 grams per kilogram of black liquor solids (gms/kg BLS).

ii) the emission rate of TRS shall not exceed 0.016 gms/kg BLS.

(e) The Company shall operate the chlorine scrubber stack so that the emission rate of chlorine shall not exceed 0.016 kg/ADt.

(f) The Company shall operate the chlorine dioxide scrubber stack so that the emission rate of chlorine dioxide shall not exceed 0.056 kg/ADt.

(g) The Company shall equip the Recovery Boiler Stack with instrumentation to determine concentrations of sulphur dioxide, TRS, opacity, flow rate and temperature on a continuous basis.

(h) The Company shall equip the Lime Kiln Stack with instrumentation to determine concentrations of TRS, flow rate and temperature on a continuous basis.

RECOMMENDATIONS (Cont.)

(i) The Company shall equip the Power Boiler with instrumentation to determine opacity of air emissions, flow rate and temperature on a continuous basis.

(j) The Company shall make the following determination annually:

i) On the Recovery Boiler Stack, the concentration and flow rate of sulphur dioxide, TRS and particulates.

ii) On the Lime Kiln Stack, the concentration and flow rate of sulphur dioxide, TRS and particulates.

iii) On the Power Boiler Stack, the concentration and flow rate of particulates.

iv) On the Smelt Dissolving Tank Stack, the concentration and flow rate of particulates and TRS.

v) On the Chlorine Dioxide Stack, the concentration and flow rate of chlorine dioxide.

vi) On the Chlorine Stack, the concentration and flow rate of chlorine.

(k) The Company under the direction of the Department shall locate and operate an ambient air quality monitoring station for determining on a continuous basis concentrations of sulphur dioxide and hydrogen sulphide as well as measuring wind speed and direction.

(l) The Company shall from time to time and at a frequency and location as directed by the Department measure downwind ground level concentrations of suspended particulate matter, hydrogen sulphide, total reduced sulphur, sulphur dioxide, chlorine dioxide, chlorine and total chlorinated dioxins and furans on a congener specific basis.

RECOMMENDATIONS (Cont.)

(m) The Company shall ensure that the following air contaminants are not in excess of the limits listed below:

Air Contaminant	Period of Time Contaminant is Measured	Concentration
Suspended Particulate Matter	1 hour average	70 ug/m^3*
	24 hour average	120 ug/m^3
Hydrogen Sulphide	1 hour average	15 ug/m^3
	24 hour average	5 ug/m^3
Total Reduced Sulphur	1 hour average	15 ug/m^3
	24 hour average	5 ug/m^3
Sulphur Dioxide	1 hour average	900 ug/m^3
	24 hour average	300 ug/m^3
Chlorine Dioxide	1 hour average	75 ug/m^3
	24 hour average	30 ug/m^3
Chlorine	1 hour average	270 ug/m^3
	24 hour average	150 ug/m^3
Total Chlorinated Dioxins & Furans	1 hour average	$\frac{X}{450} + \frac{Y}{22500} = .89$
	24 hour average	$\frac{X}{30} + \frac{Y}{1500} = 1$

Where X = Total Chlorinated Dioxins (pg/m^3) ** and
Y = Total Chlorinated Furans (pg/m^3)

* Micrograms per cubic meter (ug/m^3)

** Picograms per cubic meter (pg/M^3)

(n) All of the stack sampling facilities, survey and analytical methods and ambient air quality locations shall comply with the requirements of the Department.

RECOMMENDATIONS (Cont.)

C. General

(a) Solids Wastes

i) The construction and operation of any solid waste disposal site will be subject to regulation MR 98/88R under the Environment Act.

ii) Appropriately dewatered sludge from the waste water treatment clarifier and aerated lagoon shall be disposed at this site if levels of chlorinated dioxins and furans are below a level to be specified by the Department.

iii) Only solid wastes shall be disposed of in the new landfill.

(b) Petroleum Products

All such petroleum materials must be handled and stored in compliance with Regulation MR/97/88R under the Environment Act.

(c) Dangerous Goods

i) Aerated lagoon sludges and other solid wastes, contaminated by levels of chlorinated dioxins and furans that are above a level to be specified by the Department of Environment shall be declared to be hazardous wastes.

ii) All dangerous goods and hazardous wastes must be handled, stored and disposed of in accordance with the Dangerous Goods Handling and Transportation Act and applicable regulations.

RECOMMENDATIONS (Cont.)

(d) Equipment Maintenance and Staff training

The Company shall ensure that at all times the mill and related equipment and the wastewater and air collection and treatment systems which are installed or used to achieve compliance with the Environment licence are properly operated and maintained and that staff involved in these processes are adequately trained and that training is continuously upgraded.

(d) Contingency Plan

A contingency plan to provide emergency response shall be completed as soon as possible, and before the Phase I mill starts operation, and the plan shall be approved by the Manitoba Department of Environment, local municipal officials in The Pas, and the citizen advisory group. The Company shall conduct ongoing staff training to ensure the contingency plan can be effectively implemented under emergency conditions, shall make available and maintain appropriate equipment and shall implement process controls to regulate accidental releases of contaminants to the extent practical.

(f) Chlorine Dioxide Substitution

Within one year after operation of the Phase I mill commences, the most effective and practical rate of chlorine dioxide substitution, at or near 70%, shall be established and implemented.

(g) Citizen Advisory Group

A citizen advisory group shall be established with terms of reference and representation as identified on pages 146 to 150 of this report.

RECOMMENDATIONS (Cont.)

(h) Ecosystem Monitoring

i) Baseline data reporting needs shall be determined by the Manitoba Department of Environment, who with the cooperation of the Company shall ensure the studies are conducted and that a final report is prepared detailing the findings. The final pre-operation baseline data report shall be finished six months after completion of the one year field survey.

ii) Coordination of the post-operation impact assessment shall be a responsibility of the Department of Environment, who shall identify what monitoring must be conducted, and by whom. The Director shall be responsible for ensuring that an annual post-operation impact statement is completed and made available.

iii) The citizen advisory group shall be consulted at all stages of the ecosystem monitoring plan, and shall be provided with all monitoring data and reports as they become available.

(i) An Environment Officer position shall be staffed and located in the Town of the Pas with the responsibility for aquiring knowledge of, and monitoring the Repap operation.

(j) Licence Review

The licence shall be reviewed 3 years from the date of the start-up of the Phase I mill conversion.

APPENDIX A

The following general principles, rights and responsibilities taken from the first section of Annex 1 of Our Common Future broadly apply to the Repap Phase I project and, indeed, to all developments in Manitoba.

Fundamental Human Right

1. All human beings have the fundamental right to an environment adequate for their health and well-being.

Inter-Generational Equity

2. States shall conserve and use the environment and natural resources for the benefit of present and future generations.

Conservation and Sustainable Use

3. States shall maintain ecosystems and ecological processes essential for the functioning of the biosphere, shall preserve biological diversity, and shall observe the principle of optimum sustainable yield in the use of living natural resources and ecosystems.

Environmental Standards and Monitoring

4. States shall establish adequate environmental protection standards and monitor changes in and publish relevant data on environmental quality and resource use.

APPENDIX A (Cont.)

Prior Environmental Assessments

5. States shall make or require prior environmental assessments of proposed activities which may significantly affect the environment or use of a natural resource.

Prior Notification, Access, and Due Process

6. States shall inform in a timely manner all persons likely to be significantly affected by a planned activity and to grant them equal access and due process in administrative and judicial proceedings.

Sustainable Development and Assistance

7. States shall ensure that conservation is treated as an integral part of the planning and implementation of development activities and provide assistance to other States, especially to developing countries, in support of environmental protection and sustainable development.

General Obligation to Co-operate

8. States shall co-operate in good faith with other States in implementing the preceding rights and obligations.

APPENDIX A (Cont.)

Draft objectives and policies from the Workshop on Water released by the Government of Manitoba in the fall of 1988 that are related to the Repap proposal include the following:

Objective 1. To ensure that surface water and ground water quality is adequate to meet the needs of all users as well as to protect aquatic ecosystems.

Policy 2.1 Significant river, lake, and shoreline habitat and the general environmental, subsistence, and economic values of rivers and lakes shall be conserved for the benefit of Manitobans.

Policy 3.1 Manitoba's water resources shall be used to achieve and maintain economic well-being through their utilization and optimum economic allocation for domestic, municipal, industrial, commercial, and agricultural purposes as well as in-stream uses such as recreation, navigation, aesthetic enjoyment, fish, and wildlife habitat, waste assimilation, and power generation.

Policy 4.2 Irrigation, industrial, or other development proposals involving direct or indirect water use shall consider impacts on existing and potential water uses as well as impacts on the environment.

APPENDIX B
L I S T O F E X H I B I T S

Elks Hall, 1505 Gordon Avenue
The Pas, Manitoba
August 21, 1989 to August 24, 1989

1. Mr. Colin Gillespie, Taylor, McCaffrey, Chapman, Barristers & Solicitors, Repap Manitoba Inc. Proposal.

2. MacLaren Plansearch Inc., Environmental Impact Assessment for Phase 1 and the Supplement.

3. MacLaren Plansearch Inc., Response To Government Evaluation.

4. MacLaren Plansearch Inc., Environmental Impact Mitigation.

5. MacLaren Plansearch Inc., Environmental Monitoring Program.

6. Hon. J. Glen Cummings, Minister of Environment, Letter, (dated May 31, 1989.

7. Hon. J. Glen Cummings, Minister of Environment, Letter, (dated August 16, 1989.

8. Mr. Paul Richards, Vice-President and General Manager, Repap Manitoba Inc., Slides.

9. Figure 7-3 (Kraft process).

10. Chief Lathlin, The Pas Indian Band, Brief.

11. Mr. Antoon van der Vooren, MacLaren Plansearch Inc., Slides.

12. Mr. Antoon van der Vooren, MacLaren Plansearch Inc., Slides.

13. Mr. Michael McKernan, MacLaren Plansearch Inc., Slides.

14. Mr. Gordon Craig, Beak Consultants, Slides.

15. Mayor Bruce Unfried, Town of The Pas, Brief, (dated August 21, 1989).

16. Mr. Bill Kennedy, E.E. Hobbs & Associates Ltd., Brief, (dated August 11, 1989) read by Chief Jim Tabacco.

17. Susan F. Lambert, Submission, (dated August, 1989).

18. Mr. J.P. Bodnar, Commercial Fishermen's Group, Submission, (dated August 21, 1989).

APPENDIX B (Cont.)

19. Dr. A.S. Banks, Submission.

20. Mr. D.I. Fahlgren, Director, The Pas & District Chamber of Commerce, Submission.

21. Prof. Peter Miller, Time to Respect Earths Ecosystems, Brief, (dated August 11, 1989).

22. Mr. Glen Riding, President, Clearwater Lake Cottage Owners' Association, Brief, (dated August 14, 1989).

23. Ms. Caroline Skrypetz, Brief.

24. Mr. Jerry Henderson, Swampy Cree Tribal Council, Brief, (dated July 12, 1989).

25. Mr. Jack Kennedy, Brief, (dated August 22, 1989).

26. Mr. Antoon van der Vooren, MacLaren Plansearch Inc., Slides.

27. Dr. Robert Willes, MacLaren Plansearch Inc., Slides.

28. Mr. Michael McKernan, MacLaren Plansearch Inc., Slides.

29. Ms. Janet Kinley, MacLaren Plansearch Inc., Slides.

30. Manitoba Keewatinowi Okimakanak Inc., Letters, (dated August 4, 17, 22) and Clean Environment Commission, Letter (dated August 10, 1989).

31. Mr. Joseph G. Kass, Vice Chairman, Repap Enterprises Inc., Brief, (dated August 23, 1989).

32. Mr. Jack Johnson, Brief.

33. Mayor Ted Bercier, Moose Lake Community Council, Submission, (dated August 22, 1989).

34. Mr. Chris Monk, National Representative, Canadian Paperworkers Union, Submission.

35. Ms. Heather Henderson, Submission.

36. Mr. Clem Jones, Ducks Unlimited Canada, Submission, (dated August 18, 1989).

37. Mr. Rick Hay, Northern Zone Manager of The Freshwater Fish Marketing Corporation, Brief, (dated August 21, 1989).

APPENDIX B (Cont.)

38. Mr. Tony Lussier, President, Keewatin Community College, Brief, (dated August 23, 1989).

39. Mr. Nick Carter, Manitoba Environmental Council, Brief.

40. Mr. Michael McKernan, MacLaren Plansearch Inc., Slides.

41. Mr. Norm Brandson, Environmental Management, Manitoba Environment, Letter, (dated August 24, 1989).

42. Mr. Larry Strachan, P. Eng., Chief, Environmental Control Programs, Manitoba Environment, Submission, (dated August 19, 1989).

43. Mr. Larry Strachan, P. Eng., Chief, Environmental Control Programs, Manitoba Environment, Joint Consultative Committee, Brief.

44. Mr. Larry Strachan, P. Eng., Chief, Environmental Control Programs, Manitoba Environment, Exhibit, Alcell Process.

APPENDIX B (Cont.)

L I S T O F E X H I B I T S

Winnipeg Art Gallery, 300 Memorial Blvd.
Winnipeg, Manitoba
August 28, 1989 to September 1, 1989

Reconvened at the
WM Ward Laboratory, 745 Logan Avenue
Winnipeg, Manitoba
September 5 to September 6, 1989

1. Ms. Claire Dansereau and Mr. Jim Anderson, IWA-Canada, Brief.

2. Mr. Dave Newman, Manitoba Chamber of Commerce, Brief.

3. Mr. Dale Johnston, Norman Regional Development Corporation, Brief.

4. Mayor Bruce Unfried, Town of The Pas, Brief.

5. Mr. John William Thomas, Chemawawin First Nation, Brief.

6. Ms. Brenda Leslie, Manitoba Association of School Trustees, Brief.

7. Dr. Lyle Lockhart, Department of Fisheries and Oceans, Slides and Report.

8. Mr. Michael McKernan, MacLaren Plansearch Inc., Slide, (given to Dr. Lockhart).

9. Mr. Leo Desilets, Manitoba-Winnipeg Building and Constuction Trades Council, Brief.

10. Dr. William Goddard, Crossroads Resources Incorporated, Brief.

11. Dr. Diane Malley, Manitoba Environmental Council, Brief.

12. Mr. Nick Carter, Conservation Strategy Association of Manitoba, Brief.

13. Mr. Mike Sutherland, Manitoba Environmentalists Incorporated, Slides.

APPENDIX B (Cont.)

14. Ms. Alexa Campbell, Consumers' Association of Canada, Brief.

15. Mrs. Nadine Kampen, Recycling Council of Manitoba, Brief.

16. Mr. William Spence, Recycling Council of Manitoba, Brief, (read by Mrs. Nadine Kampen).

17. Dr. Eva Pip, Department of Biology, University of Winnipeg, Brief.

18. Mr. Al Maki, Manitoba Naturalists Society, Brief.

19. Mr. Bill Zaretski, The Sierra Club of Western Manitoba, Brief.

20. Prof. Peter Miller, Time to Respect Earths Ecosystems (T.R.E.E.), Brief.

21. Mrs. Doersam and Mrs. Zeiler, Brief.

22. Mr. Hugh Arklie and Family, Brief.

23. Mr. Kenneth Emberley, Brief.

24. Mr. Dave Hill, Hill & Abra, Letter, (dated August 23, 1989).

25. Mr. Paul Richards, Vice-President and General Manager, Repap Manitoba Inc., Personnel Information regarding MacLaren Plansearch Group.

26. Mr. Derek Elion, MacLaren Plansearch Inc., Slides.

27. Mr. Gordon Craig, Beak Consultants Ltd., Slides.

28. Mr. Pat Maley, Repap Ferrostall, Letter (dated June 26, 1989).

29. MacLaren Plansearch Inc., Slide, (presented to Michael Anderson by MacLaren Plansearch Team).

30. Dr. Robert Willes, CanTox Inc., Slides.

31. Ms. Janet Kinley, MacLaren Plansearch Inc., Slides.

APPENDIX B (Cont.)

L I S T O F E X H I B I T S

Wescana Inn, The Pas, Manitoba
September 14, 1989

1. Mr. Michael Anderson, Manitoba Keewatinowi Okimakanak Inc., Summary.

2. Mr. Hubert Sinclair, Manitoba Metis Federation, Brief.

3. Mr. Harold Taylor, MLA, Liberal member for Wolseley, Brief.

4. Mr. Colin Gillespie, Taylor, McCaffrey, Chapman, Closing Submission